Ongoing domestic freight volume information study

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Abbreviations and acronyms

CFS	Commodity Flow Survey
CSORGT	Continuing Survey of Road Goods Transport
eRUC	electronic road user charging
FAF	Freight Analysis Framework
FIGS	Freight Information Gathering System
MBIE	Ministry of Business, Innovation and Employment
MoT	Ministry of Transport
MPI	Ministry for Primary Industries
NFDS	National Freight Demands Study
RUC	road user charges
SH	state highway
SNZ	Statistics New Zealand
TDG	Traffic Design Group Ltd
TMIF	Transport Monitoring Indicator Framework

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Executive summary

Overview

The importance of the freight sector in supporting and encouraging a high level of economic development is increasingly being recognised by public sector agencies in New Zealand, and effective planning for the sector requires a clear understanding of current and likely future freight patterns. Good data is also required by those providing services within the sector to enable them to plan their operations in an efficient manner. In the 2012 report *International freight services inquiry*, the New Zealand Productivity Commission reinforced the importance of good freight data collection.

While the Ministry of Transport's 2008 National Freight Demand Study (NFDS) provided a reasonably comprehensive picture of freight movements in New Zealand in 2006-07, this is becoming increasingly outdated both by the general passage of time and in the light of the significant changes in the patterns of economic activity and freight movements that have arisen as the result of the global financial crisis. The effects of this crisis were just becoming apparent when the study was undertaken, and have subsequently had a substantial impact on the movements of many commodities, both basic and manufactured.

It is recognised, however, that the collection of comprehensive and reliable freight data can impose costs on those providing the information. Since the NFDS was undertaken there has been substantial growth of electronic systems for tracking vehicles and for the management of freight information. It was perceived, therefore, at the inception of this current study that these could provide an opportunity for improved freight data collection, possibly by gathering information directly from firms, which might help reduce the costs to those providing the information.

The project was completed in two main stages. The first considered the ways freight data is collected in a range of overseas countries, with four of these selected for more detailed examination. The second drew on this information, as well as our understanding of the situation in New Zealand, to identify possible ways in which future freight data might be collected. An important element of this was to consider the repeatability of any data collection exercise, to facilitate the regular updating of reports in the future.

Freight data collection overseas

The four countries considered - the US, UK, Australia and Sweden - all adopted different approaches to freight data collection, although some common themes could be identified. All of these combined one or more mandatory surveys, either of transport operators and/or of the producers or shippers of goods, with information drawn from a wide range of other sources. We found the US provided the most comprehensive approach, based on a large Commodity Flow Survey supported by a wide range of data collection and analysis brought together in an interactive website that was available to the public. This allowed the identification of freight flows by commodity, mode and origin/destination. However, this was a very expensive process, with an estimated overall cost per cycle equivalent to about NZ$55-75 million. The other countries examined undertook detailed surveys of particular components of the freight task (road goods vehicles in the UK and Australia, and commodities in Sweden), but did not provide publicly available data in the comprehensive multimodal detail provided by the US, and by New Zealand in the NFDS.

A common theme for all the countries considered was that to provide comprehensive data on freight movements, a hybrid approach, combining data from a range of sources, was necessary. In general for the countries examined, data was collected through periodic surveys of the relevant parties rather than any forms of direct automatic data collection. In many cases the data was collected using forms completed

manually, although the use of electronic questionnaires was expanding, giving particular benefits to the agencies collecting and analysing the data and also potentially allowing direct interfacing with the firms' management information systems.

Possible approaches in New Zealand

Building on the experience overseas and the requirements for New Zealand, a framework has been identified for the desired data collection covering commodities, modes, and origins and destinations. Given the nature of the freight task in New Zealand, with a high proportion of total commodity flows made up of primary products (particularly aggregates, milk and dairy products, and logs and timber products), the commodity list has been developed in a way that will allow these to be identified in a degree of detail. This will allow an understanding of current traffic patterns and will form an important basis for future forecasting.

In order to obtain this information, a number of approaches that could be applied in New Zealand was developed, ranging from a simple update of NFDS using published sources of information only, to more complex processes involving surveys of different types and exploring the use of the direct collection of electronic information. In all cases, these involved collecting data from a number of sources and combining them to provide an assessment of freight patterns as a whole.

During the course of the study, it became clear that there was little appetite for any form of mandatory surveys of the types typically conducted in other countries. As a consequence, any form of data collection proposed should therefore be voluntary. It was recognised that a voluntary approach would be assisted by clear support from the sponsoring agency and a willingness to explain how the data would be used to support the freight sector.

Electronic freight data collection

The issue of the extent to which electronic forms of information collection could be used to support the freight data collection process was considered in some detail. Two main sources of information were considered: GPS (Global Positioning System) vehicle-tracking information and information derived directly from firms' own management information systems. Although in practice there may be integration of these two forms of data, it is useful to consider them separately.

Tracking of commercial road vehicles through GPS technology is widely considered to have become commercially viable around 2006. Uptake since then has been significant, with improvements in quality, accuracy and functionality accompanied by reductions in price. The potential for this to contribute to the freight data collection task was therefore investigated. However, although GPS systems provide a wealth of detail on vehicle operations, they do have important limitations in the information that can be provided in the context of a freight data collection exercise, rather than one collecting data on vehicle movements. Vehicle-tracking systems by themselves are unable to provide information on commodity or weight, and there would possibly be some degree of difficulty in providing information on ultimate origins and destinations. There are also issues of confidentiality, although since in many cases the data is processed for firms by third-party operators, these confidentiality constraints may be surmountable.

Given the limitations of the data that may be available, we consider that current GPS-type systems could only make a limited contribution to the freight data collection exercise at a national level, and so were not considered a viable solution at the present time. However, it is recognised that the technology is rapidly developing, possibly through the use of smartphones, and this may have potential in the future.

The other potential source of electronic freight data collection is directly from the management information systems of the firms involved. While this was considered in some detail, it was recognised that although this is technically feasible, there are very substantial confidentiality concerns. Data from these systems could be extracted by the firms themselves and analysed before passing it on, but the direct collection of this data on a reasonably comprehensive basis is extremely unlikely to be achievable.

Proposed approach

Our proposed approach to freight data collection in New Zealand is based on a hybrid approach, combining data from a wide range of sources. This would involve:

- collecting information from both producers as well as transporters of commodities
- collecting information from a variety of different sources, reflecting those who are most easily available to supply the data.

As far as possible, the firms participating would be encouraged to enter into long-term agreements with the sponsoring agency to provide the data requested at periodic intervals. This would facilitate the regular update of the NFDS. The repeatability of the process would be facilitated by the detailed recording of the processes used for the update, which in many cases build on those developed for the initial NFDS.

It is envisaged that the hierarchy of data collection would include the following steps:

1 Collect data that is freely available from public sources.

2 Purchase data that is available from public sources.

3 Acquire unpublished data from key commodity producers, transport operators, and other parties who have demonstrated their willingness to participate in exercises such as these.

4 Aim to acquire data from firms who have not so far demonstrated their willingness to participate.

5 Where gaps still remain, identify alternative approaches such as synthetic modelling based on high-level economic inputs,

In summary, data on freight movements will have to be obtained from a number of sources with different formats if it is to be anything like comprehensive and accurate. As a result there is unlikely to be any simple process that allows the national patterns of freight movement to be generated automatically from the various sources of information that are realistically going to be available. The production of national freight matrices will therefore always require a substantial element of judgement in putting together the information available from the disparate sources.

Abstract

The availability of comprehensive and reliable information on the movement of freight is increasingly seen as an important element in the effective planning for the sector, both by those providing infrastructure and those providing services. However, the main source of data on freight movements, the Ministry of Transport's National Freight Demand Study, was based on data that is now outdated. Given the substantial changes that have subsequently taken place, there is a need to consider how this might be updated. This should be undertaken in a way that as far as possible minimises the burden to data providers and is easily repeatable.

The purpose of this current study was to identify ways this updating might be achieved. In particular, it was recognised that new methods of collecting data on freight movements have developed since 2008, and the extent to which these might be used formed a part of the investigation. The study was conducted in New Zealand from 2011 to 2013.

Based on a review of the approaches used both in New Zealand and overseas, it was concluded that a hybrid approach that draws data together from a number of sources would be the most appropriate and would provide the best opportunity to update the earlier work most effectively.

1 Introduction

1.1 Background and scope of the study

The importance of the freight sector in supporting and encouraging a high level of economic development is increasingly being recognised by public sector agencies in New Zealand, and effective planning for the sector requires a clear understanding of current and likely future freight patterns. Good data is also required by those providing services within the sector to enable them to plan their operations in an efficient manner.

The position is neatly summarised in a recent US Transportation Research Board scoping paper (TRB 2011), which states:

> *Public infrastructure managers, environmental planners, freight shippers, and carriers need to understand and anticipate freight flows between regions, in corridors, and on particular links. They rely on freight data for management, planning, and improving supply-chain efficiency. This requires a variety of data describing the types of freight; volumes; origins, interchanges, and destinations; and the characteristics of modes (air, truck, rail, maritime, and pipeline) that carry that freight.*

The collection of data on the movement of freight, or on the movement of vehicles carrying freight, is currently undertaken to a limited extent in New Zealand and more broadly in a wide range of overseas countries. On the basis of a literature review and contacts with a selection of persons involved in the collection or use of freight data, this report describes the different approaches to the collection of data and where possible, provides information about issues associated with the collection of the data and the associated costs. It then sets out possible approaches to future freight data collection in New Zealand.

This report examines the current position on the collection of freight data at a national level in New Zealand and a selection of overseas countries, illustrating a range of approaches. For each of the countries, the report aims to address the following issues:

- the key source of information on the national freight task
- who collects it, and how often
- from whom it is collected
- the costs associated with this
- the limitations on its use
- any need for supplementary data to provide:
  - a comprehensive national position
  - inputs to area-wide traffic models
- how this supplementary data is collected and why

- the use made of electronic sources of data (including those from logistics and freight operators, GPS (Global Positioning System)/fleet-tracking systems and other similar sources in this process), and at what level they are included.

Methods of collecting data on the freight task can be broadly divided into two categories:

- *Methods that have traditionally been used to date:* These typically involve a hybrid approach, combining a survey or surveys of users with the use of existing material collected for other purposes from agencies involved in the freight sectors (eg railway companies, port companies, etc) to give a full picture of freight movements. This approach is typically used for the collection of freight data at a national level and the different components may or may not be integrated to provide a comprehensive assessment of national freight movements.
- *New methods making use of Intelligent Transportation Systems (ITS) and other electronic approaches to the collection of data on the movement of freight:* While these include a wealth of information on the movement of vehicles or the movement of goods by individual operators, and are used by them for detailed management and planning purposes, only limited amounts of this data has been available in the public domain for transport-planning purposes, generally in the form of one-off responses to specific requests. To date, this approach has generally been used at a more local level or for the collection of specific types of data. The potential for the extraction of this data from firms' information systems on a more automatic basis for use in transport planning at a national level is being investigated and is considered in this report.

Each of these methods is considered separately in this report.

1.2 Report structure

The report starts by considering the current techniques for the collection of freight data adopted by a number of overseas countries and also New Zealand, providing insights into different techniques. Chapter 8 includes the comments made in the recent Productivity Commission report *International freight services inquiry* (New Zealand Productivity Commission 2012).

The overseas countries were selected to illustrate how different approaches are applied in practice, and the range of activities that is necessary to give the desired level of information on freight flows.

On the basis of this, the report then outlines the information that should be collected, and the methods of doing this. It then considers in more detail the appropriate methods of collection. The costs of the various approaches are identified in chapter 19, and then a framework for the collection of information on each of the commodities identified is developed.

The findings are brought together in the conclusions section.

Appendix A contains a copy of the US Commodity Flow Survey questionnaire.

Appendix B contains a copy of the UK Continuing Survey of Road Goods Transport questionnaire for articulated vehicles.

Appendix C contains a copy of the Swedish Commodity Flow Survey (translated into English).

2 Purpose and objectives of the study

The main source of comprehensive information on freight movements in New Zealand, the National Freight Demands Study (NFDS), was undertaken by Richard Paling Consulting in 2008. This was based on data collected for 2006-07, before the full effects of the global financial crisis and its impact on economic activity and freight flows were felt. Given this impact as well as the more general changes in freight patterns that unavoidably occur over time, the information in the NFDS is becomingly increasingly out of date and therefore inevitably provides a less reliable basis for planning.

In response to this, the Request for Proposal (RfP) for the current study stated:

> *In order to achieve the Government's short-medium and long-term outcomes for transport, it is essential that we obtain ongoing information about what types of freight are being carried, where it is being carried to, and by what mode(s). This information will be needed for effective infrastructure planning and policy making.*

The information in the NFDS was primarily at a commodity level (although to some extent the findings were translated into heavy vehicle movements to facilitate comparison with observed traffic counts). Any update of the NFDS would need to repeat this focus on the movement of commodities rather than vehicles, providing an updated snapshot of activity for a particular year. The NFDS also looked at the volumes carried by particular modes in 2006-07, and again this information would be required in any update.

The geographical focus in the NFDS was primarily at a regional level, although estimates and forecasts of movements within regions were also provided.

Since the publication of the NFDS, there has been increasing use of electronic means of data collection and processing, and the development of GPS and other vehicle-positioning software has had a high profile. This has allowed the accumulation of substantial databases on vehicle movements, which could provide a valuable resource for understanding some aspects of freight movements, and this is investigated in this study, looking at both New Zealand and international experience. The Freight Information Gathering System (FIGS) developed by the Ministry of Transport (MoT) in 2012 has also used some innovative methods of data collection, including the use of a direct linkage into the records of container movements at all the major ports. There could be potential for extending this approach more widely.

It is against this background of a database that is becoming increasingly outdated and the potential emergence of new methods of data collection that this study was commissioned. Given the general requirement for better information on the patterns of commodity flows, the report looks at overseas experience and how different types of data are collected in different countries, before considering the exact form of data collection for New Zealand and the way or ways in which this might be achieved.

3 Freight data collection in the US

3.1 Introduction

In the US, information about the freight task is gathered via a Commodity Flow Survey (CFS). As its name indicates, this focuses on the movements of commodities rather than on the means of transporting them. In response to criticism about the coverage of early rounds of the CFS itself (Southworth 2005), the overall data collection exercise has been extended over time. Although the survey still forms the major component of the assessment of the freight task, it is now supported by a significant range of other data-gathering and analysis steps in order to provide a comprehensive assessment of the freight movements in the US. The collection of rail data, which is part of this process, is highlighted separately.

Our analysis of the US position has focused on national freight data collection, since this is undertaken in a very comprehensive fashion and much of the subnational assessment in the US is based on this, supplemented by more local data collection including some use of GPS data to look at conditions facing heavy goods vehicles and routing decisions.

3.2 Commodity Flow Survey (CFS)

The Commodity Flow Survey (BTS 2007) forms the backbone of the freight data collection task in the US. It is undertaken at five-year intervals and forms part of a more general economic census. The survey is undertaken by the Census Bureau on behalf of the Bureau of Transportation Statistics (BTS), an agency funded from the Highway Trust Fund administered by the Federal Highway Administration.

The key features of this survey include the following:

- Data is collected from the shippers of goods, not from transport operators.
- The survey currently has a sample size of about 100,000 businesses, out of a total sample frame of about 750,000 businesses located in the 50 states and the District of Columbia. In 2007 it covered 4.9 million shipment records. The sample size has varied over time, but there were concerns that the smaller sample size in earlier surveys did not provide an adequate level of coverage.
- The questionnaires are sent out by mail but respondents have the option of using either the paper form or an internet-based form to reply. About 50% of respondents chose the on-line approach in the initial round of the most recent census, which was the first time the internet option had been offered.
- The businesses covered include those in manufacturing, mining, and wholesale activities, as well as selected retail establishments comprising electronic shopping and mail-order houses, fuel dealers and publishers.
- Transportation, construction, most retail and services industries, farms, fisheries, foreign establishments and most government-owned establishments are excluded from the survey.
- Because of the nature of the survey, imported goods are excluded up to the point where they reach an importer's warehouse, although subsequent movements are covered.

- Response to the survey is mandatory. Typically a response rate in the range of 80-85% is achieved.[1]
- The sample has been developed using a process of stratification on industry type and geographical location. The total size of the sample (about 100,000) has been determined to reflect budgetary constraints and the stratification is used to ensure that the best results are obtained from this overall sample size constraint.
- Hazardous goods' movements are highlighted.
- The firms selected have to respond four times per year for activities covering one week. For up to 40 shipments, the firms have to detail all shipments, but where they have sent out more than this number, a process is set out for selecting an appropriate sample. Processes have been developed to estimate the mileages that the goods are transported and to impute details of shipment value or weight if these have not been provided.
- The form for respondents is estimated to take no more than two hours to complete.
- The survey has a 5-6 year cycle – three for planning the survey, a year to undertake the surveys, a year to code the results and a year to review and release the data.
- The material is coded to states and major metropolitan areas.
- The cost of the survey is estimated at about US$23 million, of which 80% is funded by the Bureau of Transport Statistics (Census Bureau, pers comm, February 2012).

Appendix A contains a copy of the CFS questionnaire.

3.3 Rail information

Rail information is derived from rail companies by means of a sample survey of waybills, run by the Surface Transportation Board (part of the Department of Transportation). The survey is a stratified sample of wagonload waybills drawn from all US railroads on which 4500 or more revenue wagonloads terminate in a year. This criterion, equivalent to 86 loads per week, would include all but the smallest short lines. Stratification is on the basis of the number of wagonloads on a waybill (those with more loads get sampled more frequently).[2]

In principle, the information is confidential and is used by a limited group, including government agencies for planning and policy, and by participants in regulatory proceedings. The confidentiality constraint is because the data includes sensitive shipping and revenue information,[3] such as the exact loading and unloading points and junctions en route, as well as the railways involved.[4] There is a public version (the 'Public Use Waybill Sample'), which amalgamates these details into Business Economic Area (BEA) units –

1 BTS Performance Goals. Accessed 22 July 2013. www.bts.gov/publications/performance_report/html/performance_goals.html

2 Details in US Code of Federal Regulations: see 49 CFR 1244.4. www.gpo.gov/fdsys/pkg/CFR-2009-title49-vol9/pdf/CFR-2009-title49-vol9-part1244.pdf. Accessed 22 July 2013.

3 www.stb.dot.gov/stb/industry/econ_waybill.html. Accessed 22 July 2013.

4 www.stb.dot.gov/stb/docs/Waybill/Creation%20of%20the%20Public%20Use%20Waybill%20Sample.pdf. Accessed 22 July 2013.

172 groups of counties – for origin and destination, and states for junction points. Commodities are identified at a detailed 5-digit Standard Transportation Commodity Code (STCC) level, except for munitions (which is at a 2-digit level), and commodities that are handled at fewer than three stations in the whole country. BEAs are also not reported when there are less than three stations in them. This limits full geographic data to 45-50% of the waybills (see footnote 4 on the previous page). In 1994, the proportion of waybills sampled was 2.83%.[5]

The public database includes a large number of variables, including wagon details, container and trailer-on-flatcar details, a classification of the type of intermodal service, import/export, water movement, hazardous materials, billed and actual weight, revenue, distance, originating and terminating BEA, and interchange states.[6] A description of the data elements is available. There is also a 190-page 'Reference Guide' to the Waybill Sample, with statistics, codes, BEA definitions, STCC codes (the list is 50 pages long).[7] As well as the waybill sample, all seven Class I railroads have to submit quarterly and annual freight commodity statistics to the STB. These are again commodity-based at the 5-digit level, but do not include any origin/destination data.

The rail waybill data is collected separately from the CFS and there is an overlap where the CFS commodities (a limited range, by container, road and rail) are also surveyed by the waybill sample (which covers all commodity groups, by rail only). This overlap is addressed on the Freight Analysis Framework (FAF) process (see next section), which uses the rail waybill data (and data on waterborne traffic) to fill in missing or under-represented flows in the CFS data.

3.4 Freight Analysis Framework (FAF)

3.4.1 Introduction

While the CFS provides a large database of freight movements, a number of flows are excluded. To provide a more comprehensive database, the results from the CFS are input to the Freight Analysis Framework (FAF), the results of which are available on the internet. As noted on the Federal Highway Administration website, 'The FAF integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation'.[8] The FAF process enhances the CFS data to cover non-response and also includes a number of 'out-of-scope' (OOS) commodities and flows, which are estimated using a range of bespoke modelling techniques. The current version is v.3, commonly referred to as FAF^3.

3.4.2 Non-response

Issues with non-response in the CFS database, arising as the result of the sampling process itself, are addressed by a range of approaches. These include the use of detailed information on rail and inland

5 See table 1, p185 in 'The Carload Waybill Statistics: Usefulness for Economic Analysis', an article in the *Reference guide*. Accessed 22 July 2013.
www.stb.dot.gov/stb/docs/Waybill/2010%20STB%20Waybill%20Reference%20Guide_JN.pdf

6 See list of 41items in 49 CFR 1244.9 See
www.gpo.gov/fdsys/pkg/CFR-2009-title49-vol9/pdf/CFR-2009-title49-vol9-part1244.pdf. Accessed 22 July 2013.

7 www.stb.dot.gov/stb/docs/Waybill/2010%20STB%20Waybill%20Reference%20Guide_JN.pdf. Accessed 22 July 2013.

8 www.ops.fhwa.dot.gov/freight/freight_analysis/faf/. Accessed 22 July 2013.

waterway flows, and also detailed inspection and review of the CFS matrices themselves in the light of information on the sampling frame and of information from earlier surveys.

3.4.3 Out-of-scope (OOS) commodities

OOS commodities are estimated to account for 32% of the US freight task on a tonnage basis and include:

- truck, rail and pipeline flows of crude petroleum and natural gas
- truck freight shipments associated with farm-based, fishery, logging, construction, retail, services, municipal solid waste, and household and business moves
- imported and exported goods transported by ship, air, and transborder land (truck, rail) modes.

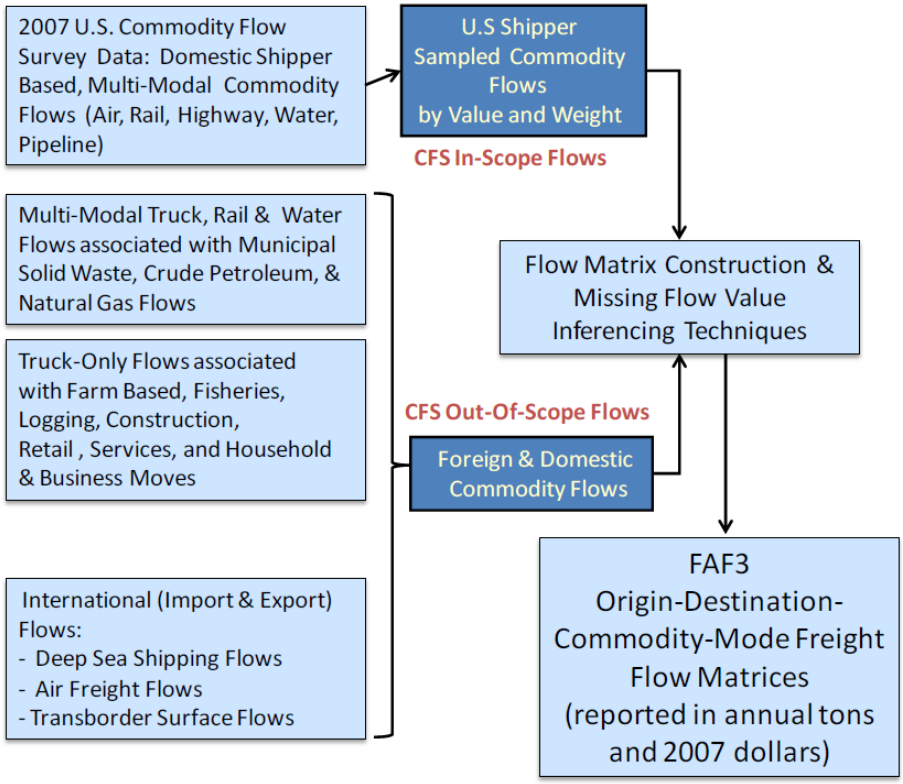
These are estimated using a range of approaches.

3.4.4 Approach to estimating overall freight flows

A range of processes is used to estimate the freight flows associated with each of the main commodities, although in many cases these rely on detailed statistics of production and/or consumption, often at a local level. Input-output models are also used in the estimation of the flow patterns.

The overall process is outlined in figure 3.1.

Figure 3.1 Overview of the FAF[3] freight flow matrix construction process (Southworth 2010)



The FAF[3] process is undertaken by a separate agency, the Oak Ridge National Laboratory, working under contact to the Federal Highways Administration.

The CFS/FAF[3] process is also supported by a more general area of work undertaken under the National Cooperative Freight Research Program (NCFRP), which aims to provide a coordinated framework for research into a range of freight-related issues in the US.[9] This is funded by central government.

The output of the FAF[3] process is an interactive database that can be used to provide statistics on freight flows by commodity, mode and origin/destination. The information is available on the internet at http://faf.ornl.gov/fafweb/Extraction2.aspx.

Using this, the data is coded either to a state level (50 zones) or a FAF zone level that distinguishes between metropolitan and non-metropolitan areas (125 zones), by commodity (44 categories) and mode (8 categories including multiple modes and pipelines). The commodity categories used are set out in table 3.1.

Table 3.1 FAF[3] commodity classes (Southworth 2010)

SCTG	Commodity	SCTG	Commodity	SCTG	Commodity
01	Live animals/fish	15	Coal	29	Printed products
02	Cereal grains	16	Crude petroleum	30	Textiles/leather
03	Other agricultural products.	17	Gasoline	31	Nonmetal mineral products
04	Animal feed	18	Fuel oils	32	Base metals
05	Meat/seafood	19	Coal-n.e.c.	33	Articles-base metal
06	Milled grain prods.	20	Basic chemicals	34	Machinery
07	Other foodstuffs	21	Pharmaceuticals	35	Electronics
08	Alcoholic beverages	22	Fertilizers	36	Motorized vehicles
09	Tobacco prods.	23	Chemical prods.	37	Transport equipment
10	Building stone	24	Plastics/rubber	38	Precision instruments
11	Natural sands	25	Logs	39	Furniture
12	Gravel	26	Wood products	40	Misc. mfg. products.
13	Nonmetallic minerals	27	Newsprint/paper	41	Waste/scrap
14	Metallic ores	28	Paper articles	43	Mixed freight
				99	Commodity unknown

Data is also available for the tonnage and value of the commodities. A sample of the output, in this case for tonnages of cereals (Commodity 02) from Iowa, is set out in table 3.2.

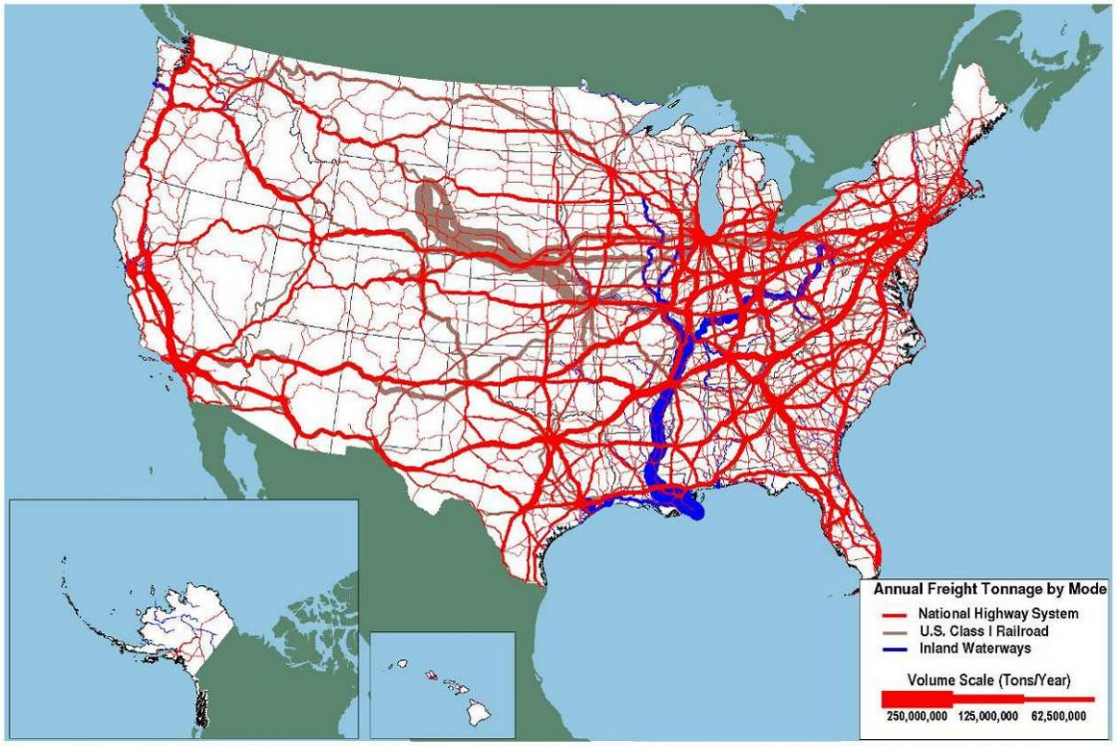
9 National Cooperative Freight Research Program. Accessed 28 June 2013. http://onlinepubs.trb.org/onlinepubs/ncfrp/docs/NCFRPbrochure.pdf

Table 3.2 Freight data in the US – sample output from the FAF database for 2007: cereals from Iowa (000 tonnes)

Destination	Multiple modes & mail	Other & unknown	Rail	Truck	Water	Grand total
Alabama					873.90	**873.90**
Arkansas			149.87	11.18		**161.04**
California	1.36	4.79	700.02	0.42		**706.59**
Colorado		0.01		1.00		**1.01**
Connecticut		1.00				**1.00**
Florida				0.95		**0.95**
Georgia	12.69		1308.95	24.35		**1346.00**
Illinois	406.00	2.65		813.97		**1222.62**
Indiana		3.74		148.50		**152.23**
Iowa	223.22	16.93	2754.33	115,005.08		**117,999.56**
Kansas		1.72		64.91		**66.62**
Kentucky				-		-
Louisiana	2346.66				3055.34	**5402.00**
Michigan		3.63		99.07		**102.70**
Minnesota	5.65			11,668.76		**11,674.41**
Mississippi				-		-
Missouri			98.87	307.47		**406.34**
Montana				2.93		**2.93**
Nebraska	58.18	10.58	358.10	645.66		**1072.52**
New York		2.00		4.94		**6.94**
North Dakota				-		-
Ohio	0.37	1.70		2.93		**5.00**
Oklahoma			359.31	-		**359.31**
Pennsylvania	2.09	0.71		11.19		**14.00**
South Dakota				153.01		**153.01**
Tennessee		1.00		32.02		**33.02**
Texas			592.21	13.90		**606.10**
Virginia		0.33		30.96		**31.29**
Washington		0.21	154.08			**154.29**
Wisconsin	3.59	3.73		489.81		**497.12**
Grand total	**3059.81**	**54.72**	**6475.75**	**129,533.00**	**3929.24**	**143,052.52**

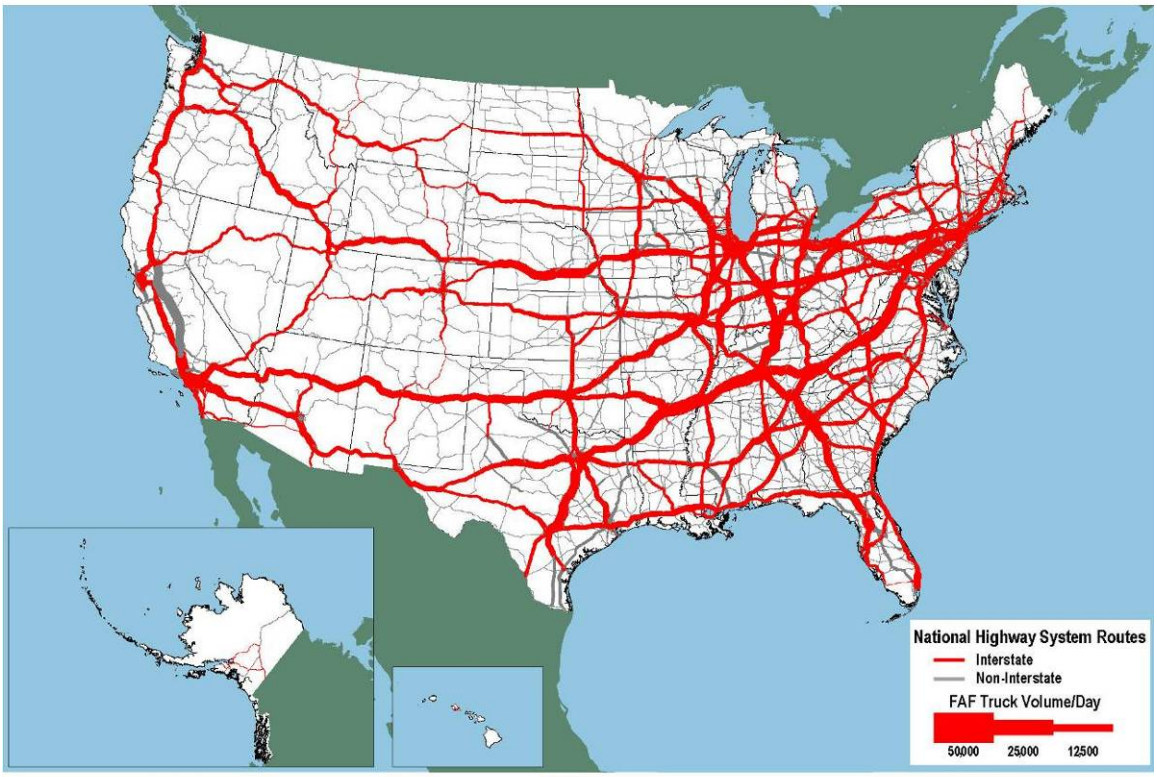
Graphical output is also available and examples of this are set out in figures 3.2, 3.3 and 3.4. It should be noted that these flows are not measured directly but are estimated on the basis of nationwide assignment models.

Figure 3.2 Tonnage on highways, railroads and inland waterways 2007



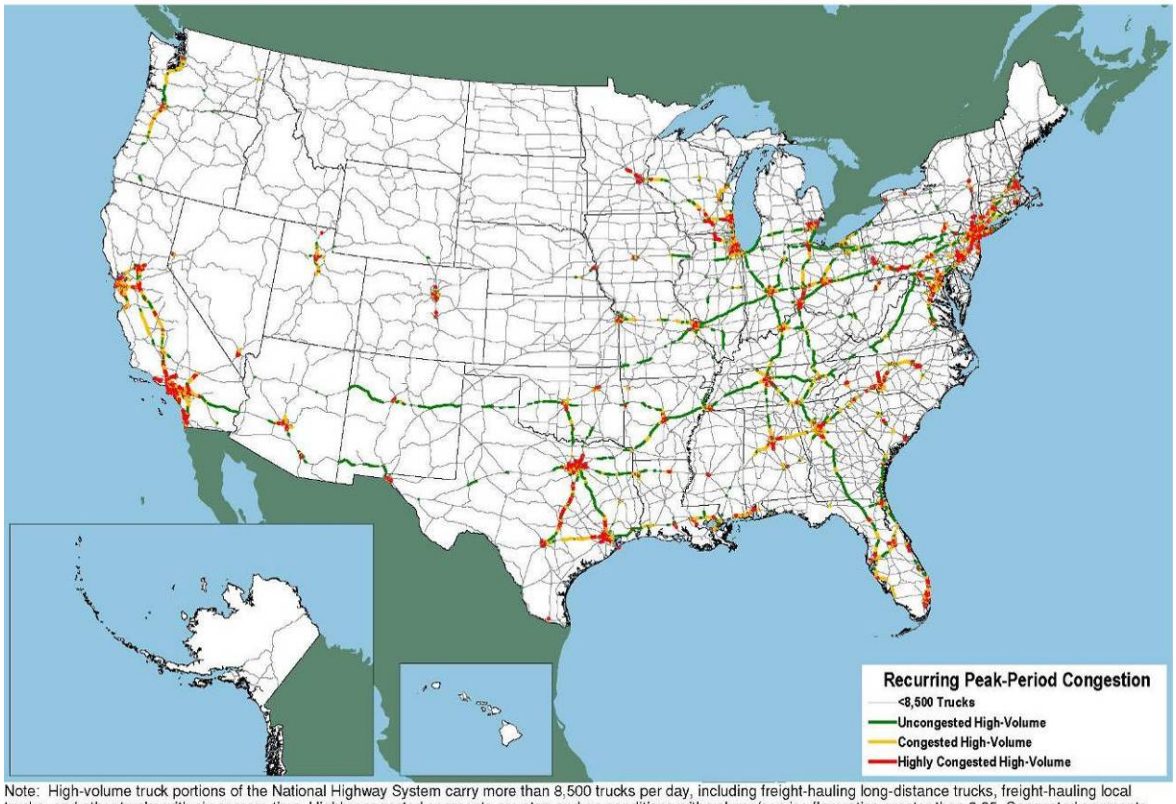
Sources: Highways: U.S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework, Version 3.1, 2010. Rail: Based on Surface Transportation Board, Annual Carload Waybill Sample and rail freight flow assignments done by Oak Ridge National Laboratory. Inland Waterways: U.S. Army Corps of Engineers (USACE), Annual Vessel Operating Activity and Lock Performance Monitoring System data, as processed for USACE by the Tennessee Valley Authority; and USACE, Institute for Water Resources, Waterborne Foreign Trade Data, Water flow asssignments done by Oak Ridge National Laboratory.

Figure 3.3 Average daily long-haul freight truck traffic on the national highway system 2007



Note: Long-haul freight trucks typically serve locations at least 50 miles apart, excluding trucks that are used in movements by multiple modes and mail.
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.1, 2010.

Figure 3.4 Peak-period congestion in high-volume truck portions on the national highway system 2007



Note: High-volume truck portions of the National Highway System carry more than 8,500 trucks per day, including freight-hauling long-distance trucks, freight-hauling local trucks, and other trucks with six or more tires. Highly congested segments are stop-and-go conditions with volume/service flow ratios greater than 0.95. Congested segments have reduced traffic speeds with volume/service flow ratios between 0.75 and 0.95.
Source: U. S. Department of Transportation, Federal Highway Administration, Office of Highway Policy Information, Highway Performance Monitoring System, and Office of Freight Management and Operations, Freight Analysis Framework, version 3.1, 2010

These figures allow the comparison of flows by the different main modes, the identification of the major long-distance flows by road, and also the extent to which the major long-distance highway freight flows are affected by levels of congestion. For this latter case, the information on heavy flows needs to be supported by a systematic nationwide assessment of congestion. This could be an area where GPS-type approaches may be able to provide a comprehensive national position.

3.5 Overall assessment of the US position

Overall, the data on freight movements in the US is very comprehensive, being developed from a number of data sources in a structured programme. The Commodity Flow Survey captures about 70% of total flows and this is supported by range of other techniques to estimate the balance. The information from the CFS and FAF[3] processes is widely available to the public through an interactive website and has developed over time in response to feedback from users and interested parties. However, the costs of this are substantial. The cost of the basic CFS itself is about $US23 million, and the costs of the additional FAF[3] processes (not published) would probably be more expensive than the initial data collection.

4 The approach in the UK

4.1 National data collection

4.1.1 Introduction

Data collection in the UK is primarily modally focused, with different approaches being adopted for the different modes of road transport, rail transport and movements by water. Because of this approach, the nature of the information that is available varies, with the most detailed information being available for the movement of goods by road. Here the position is complicated slightly by the extent to which movements by road between UK origins and destinations are undertaken by foreign-registered vehicles, for which information is more difficult to collect. However, the volume of this is relatively low at about 1% of total HGV activity.[10]

Data collection requirements for all main freight modes also have to conform to a range of EU directives,[11] which define the scope of data collection and also limit the ways in which the main surveys can be changed over time. The EU directives set fairly detailed guidelines for undertaking surveys and the collection of data, which in principle are followed by all member countries, although in practice some of the data that the requirements say should be collected is missing or only partially obtained.

4.1.2 Road transport

Information on the movement of goods by road by domestically registered vehicles is mainly undertaken via the Continuing Survey of Road Goods Transport (CSORGT).[12] This is a sample survey of the owners of goods vehicles and involves the completion of a travel diary covering all activity within a nominated week. A fairly substantial amount of information is required, both about the vehicle itself and about the activities undertaken.

The survey is carried out on a continuous basis, with a permanent team of 8-10 workers based in the UK Department for Transport. The costs of this are estimated at about GBP300,000 (NZ$600,000) per year.

The key features of the survey are as follows:

- The survey is based on a travel diary covering activities over a single week.
- The survey is paper-based, with forms being posted to the selected sample. The use of a paper form allows drivers to complete this as they go through the week. It does not rely on the use of any particular technology and so can be completed by all respondents.

The survey aims for 18,000 responses per year.

10 www.gov.uk/government/uploads/system/uploads/attachment_data/file/8967/international-activity-of-uk-registered-HGVs.pdf. Accessed 28 June 2013.

11 http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-11-015/EN/KS-RA-11-015-EN.PDF. Accessed 28 June 2013.

12 Survey approach and results are published annually by the UK Department for Transport in *Road freight statistics*.

Response to the survey is mandatory and is a condition of vehicle registration. A three-stage process is used to elicit responses and the final response rate is about 85%.

The information requested by the survey includes:

- vehicle ownership and type
- details of individual movements in terms of:
  - commodity (broken down into 20 categories)
  - weight
  - origin
  - destination
  - mode of appearance (containerised, etc).

Information on the time spent responding to the surveys is also requested.

The commodities used for the analysis are set out in table 4.1.

Table 4.1 Commodity groupings for the UK CSORGT

Group	Commodity classification detail
Agricultural products	Bulk cereals, potatoes, other fresh and frozen fruit and vegetables. Sugar (incl. beet). Live animals and animal foods.
Beverages	Alcoholic and non-alcoholic (excluding tea, coffee and milk).
Other foodstuffs	Meat, fish, dairy products, fruit cereals, other foods (incl. tea and coffee). Tobacco.
Wood, timber and cork	
Fertiliser	Natural and chemical.
Sand, gravel and clay	
Other crude minerals	Stone, chalk and other minerals.
Ores	Ferrous and non-ferrous ores. Iron and steel waste.
Crude materials	Wool, cotton, man-made fibres and other textile materials. Hides, skins, rubber. Paper (incl. pulp and waste).
Coal and coke	Includes lignite and peat.
Petrol and petroleum products	Includes crude oil.
Chemicals	
Cements	Cement and lime.
Other building materials	Bricks, etc, concrete, glass, glassware and pottery.
Iron and steel products	Pig iron, crude steel (sheets, bars, etc). Unwrought and non-ferrous alloys.
Other metal products n.e.s.[a]	Structural parts, etc.
Machinery and transport equipment	Vehicles, tractors, electrical and non-electrical machines.
Miscellaneous manufactured articles	Leather, textiles and clothing n.e.s; other manufactured articles n.e.s.
Miscellaneous articles n.e.s.	Arms and ammunition; commodities n.e.s., unknown commodities; packing containers, packaging only, pallets, parcels, household waste.

a) n.e.s. = not elsewhere specified

Appendix B contains a copy of the CSORGT questionnaire for articulated vehicles.

The published results include details of the operation of the heavy vehicle fleet, and details of total freight movements by vehicle type, commodity, mode of appearance (containerised, palletised, etc) and origin/destination pattern. More detailed statistics can be made available as required, for which no charge is made. The level of statistical reliability of the values generated is also set out in some detail. For the sample as a whole, the 95% confidence limit is within the range of +/-2 or 3%, but as the results are disaggregated the range increases.

4.1.3 Rail data

Rail data in the UK is supplied from two main sources, the train operators, who provide summary data; and the network operator, Network Rail, which provides more detailed data. Publically available information is published by the Office of Rail Regulation (ORR) in the *National rail trends yearbook*[13] and is available from the ORR website.[14] This gives national totals and a basic commodity breakdown, but does not provide any regional breakdown.

Network Rail keeps statistics based on weight, type of vehicle, and a 22-item category of commodity groups or traffic types. This is based on the commodity types the trains are scheduled to convey and may not represent the actual type or all the wagons on a train.

In addition, the origin and destination recorded are the origin and destination of the train, not of the goods. A single consignment may move on several trains. This leads to difficulties in reporting tonnes hauled, as the same tonnes may be counted more than once. Statistics reported to Eurostat are simple tonnes or tonne-miles for the network sections. While confidentiality is important, this is largely related to financial information such as rates, as the actual flows are readily worked out from public sources (but not, it appears, officially published).[15]

As well as the information in the public domain, detail is also supplied on a real-time basis by Network Rail for use in national freight modelling. It is understood that this data is more disaggregated, both by commodity and by origin/destination.

Information on the rail sector is supplied to different levels of detail but is based on comprehensive records rather than a sample, thus providing a complete picture of the activities of the sector.

4.1.4 Coastal shipping and inland waterway data

Coastal shipping and inland waterway data is provided separately in annual reports on waterborne freight in the UK, published by the UK Department for Transport.[16] These are compiled from material mainly provided by shipping lines, operators or agents under the framework required by EU Maritime Statistics Directive (Council Directive 95/64/EC) and cover the details of commodities moved and the routes over which they were transported. This material is supplemented by data on inland waterway movements, derived from an additional survey of barge operators and understood to be reasonably comprehensive.

13 See http://dataportal.orr.gov.uk. Accessed 16 October 2013.

14 See www.rail-reg.gov.uk/server/show/nav.1527. Accessed 22 July 2013.

15 Martin Holland (Network Rail), pers comm, 14 December 2011.

16 See www.gov.uk/government/publications/waterborne-freight-in-the-united-kingdom-2011. Accessed 28 June 2012.

The traffic identified is broken down into the following commodities:

- crude petroleum and petroleum products
- other liquid bulk
- ores
- coal
- agricultural products
- other dry bulk
- unitised commodities
- forestry products
- iron and steel products
- other cargo.

This provides a reasonable correspondence to the categories defined for road freight as set out earlier in table 4.1.

The information on coastal shipping and inland waterways in principle reflects total movements in this sector and therefore provides an assessment of the total level of activity.

4.2 Use of freight data

The data collected on the individual modes is not formally combined into a comprehensive assessment of freight patterns in the UK in a published source. However, it is input into the GB Freight Model developed by MDS-Transmodal for the UK Department of Transport (MDS-Transmodal 2008a and 2008b). While this is a synthetic model, it is calibrated against the data provided by a number of sources of freight data for all three modes.

The GB Freight Model has been developed in a form to provide freight matrices to be used in conventional transport planning exercises, particularly at a subnational level, and has also been used to look at a range of possible policy changes. Other freight models have been developed to cover particular areas based on similar data, although with more detailed calibration to local factors.

5 The approach in Australia

5.1 National freight data collection

5.1.1 Introduction

As in the UK, data collection in Australia is mainly modally focused, with data being collected from transport operators. As a result of confidentially issues with some of the main transport operators, particularly rail operators, comprehensive information is typically only available at an aggregated level.

5.1.2 Survey of motor vehicle use

The key source of information on road transport operations is derived from the two-yearly Survey of Motor Vehicle Use undertaken by the Australian Bureau of Statistics (ABS). This covers all motor vehicles, not just freight vehicles, and is designed to explore a number of issues. Its completion is mandatory. Freight operators are asked about their operations over a three-month period, covering their state of registration and the proportion of distance travelled in different states. Information is also sought on the commodities carried, the definitions of which are set out in table 5.1.

Table 5.1 Australian survey of motor vehicle use: commodity definitions

Food and live animals
Beverages and tobacco
Crude materials, inedible, except fuels
Mineral fuels, lubricants and related materials
Animal and vegetable oils, fats and waxes
Chemicals and related products, not elsewhere specified
Manufactured goods
Machinery, transport equipment
Miscellaneous manufactured articles
Tools of trade
Other commodities, not elsewhere specified
Unspecified

There is considerable emphasis on the statistical reliability of the data, and measures of reliability (the relative standard error – RSE) are provided for virtually all the aggregate numbers in the published reports available on the ABS website. In general, the total numbers have relatively small RSEs of the order of 2-3%, but as the results are disaggregated the errors increase. The tables produced note where the numbers have such a high RSE that they cannot be considered to provide reliable estimates.

5.1.3 Rail

Statistics on rail freight were produced for 2007-08 in *Australian rail freight performance indicators 2007–08* (BITRE 2010a). This was compiled jointly by the Australasian Railway Association and by the

Bureau of Infrastructure, Transport and Regional Economics (BITRE), an agency of Department of Infrastructure, Transport, Regional Development and Local Government, part of the Australian Government. The Australasian Railway Association includes all rail operators (private and government), track owners and managers, and manufacturers of rolling stock and components in Australasia. The freight data is compiled from returns produced by the predominant operators, but excludes freight carried by some smaller intrastate operators.

The information presented includes both inter- and intrastate movements and defines movements in terms of 'intermodal', steel and bulk freight. In this context intermodal is defined in terms of the market served as 'relatively high-priority goods for which road freight is a strong competing mode' and effectively includes all goods not regarded as bulk or steel. It therefore includes goods moved in box wagons as well as in conventional containers.

Although the origins and destinations of rail traffic are presented at a state level, it is recognised that there are issues with defining these where goods are transferred between operators or even between divisions within the same firm. While the aggregate tonne-kms should be correct, the attribution of these to particular movement origins and destinations may be incorrect to the extent that these transfers take place. While this is noted as an issue, no assessment is made of the impact of this on the results reported. As indicated above, there are also issues when bulk cargoes such as iron ore are moved by container and the definition by commodity is mainly left to the railway operator.

5.1.4 Coastal shipping

Coastal freight figures have been derived from data supplied by port authorities for BITRE's annual coastal freight survey (BITRE 2011), which cover the total volumes transported, by year. Tonne-kilometre figures are calculated by applying port-to-port distances, including pilotage (Australian Chamber of Shipping 1993) to total tonnages loaded or unloaded for each port pair. Where several alternative routes within Australia could reasonably be used, the shorter distance has been used.

The information from the port is based in turn on information from ships' agents, who are required to provide this to the port. It is recognised that issues arise with the allocations of cargoes to particular commodity definitions, and also to the destinations or origins of cargoes if vessels are making multiple stops on their journeys - in some instances attempts are made to correct these.

The commodity classes for which data is collected include two sets of definitions. The more detailed of these, which breaks commodities down into groups, is similar to that used for road transport and is set out in table 5.1.

A simpler breakdown that is also reported comprises:

- dry bulk
- liquid bulk
- container
- other cargo.

This is slightly different to the definitions used for rail.

Flows are reported at a state level and also at a slightly more detailed level, distinguishing movements between capital-city ports and other ports in the states. Flows between states are presented at the more detailed commodity level as set out in table 5.1.

5.1.5 Combined freight flows

The three sets of data on road, rail and coastal shipping freight flows are put together at an aggregate level to give an indication of the total intermodal freight task within Australia and the modal splits on interstate movements. These are included in the assessment of rail flows discussed above, and on a corridor basis are provided for the period from 1971 to 2007 to enable long-terms trends to be identified. Interestingly, a similar exercise is not undertaken for the movements of bulk commodities, and there is therefore no assessment of the total freight task in Australia other than at the total level for each mode.

However, a separate document, *Interstate freight in Australia report* (BITRE 2010b), provides different figures for the total interstate freight task, which reflect different definitions with respect to cargo weights and the breakdown by commodity group.

5.1.6 Freight Movement Survey (FMS)

In the past, the Australian Bureau of Statistics combined the results of a series of modal surveys to develop a full Freight Movement Survey (FMS)[17] covering the movement of freight within Australia by all modes (including air) to a fairly disaggregated spatial and commodity level. For road freight, information was gathered from a sample survey but for the other modes of rail, air and sea, complete annual data was collected from the various operators and agents.

The survey was discontinued in about 2001, apparently following concerns about its reliability. A problem with the survey was probably the level of detail to which the study aspired, initially with about 40 commodities, 4 modes and 190 geographical areas. The commodity list was subsequently reduced to about 20 but the survey itself was not updated after 2001. Changes to the ownership of a number of transport operations also probably made the collection of such detailed information more difficult, particularly in relation to the detailed commodity descriptions included in the FMS.

5.2 Subnational model development and data collection

To supplement the national data available, Freight Movement Models (FMM) have been developed for almost all the major cities in Australia.[18] These comprise a number of approaches to supplement the more basic data from the Survey of Motor Vehicle Use. They include local surveys of freight generation characteristics for a limited number of industry types which, combined with the distribution of employment, aim to estimate overall freight generation characteristics through production and consumptions models. This data is then supplemented by a range of other locally generated data on observed traffic flows and typical trip length distributions (for which limited GPS data is applied) to build up a calibrated model of freight flows for the capital cities. These can then be incorporated into the conventional transport models used for planning purposes.

17 See www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/9220.0Mar%202001%20%28Reissue%29?OpenDocument Accessed 28 June 2013.

18 G Eitzen, pers comm, 21 November 2011.

Because of the approach taken for these models, they do not give indications of the commodities carried. They are also very reliant on assumed relationships between employment and trip generation by type, which are stable both geographically and over time. However differences in manufacturing and logistics operations and their evolution over time means that any forecasts need to be treated with a degree of caution. The FMM is also focused on truck transport, and its ability to handle freight flows by other modes into and within the model areas is limited.

6 The approach in Sweden

6.1 Introduction

In Sweden, freight flows are measured by a number of approaches, with the focus on a regular commodity flow survey of the broad type undertaken in the US study, conducted about every four years. The latest survey was in 2009; the previous one was in 2004-5. At the time of this research, preparations for the next survey were underway. Again, as in the case of the US, this is supplemented by other separate surveys into the three main modes of road, rail and shipping.

6.2 The Commodity Flow Survey (CFS)

The methodology of the commodity-based survey, conducted by the official statistics bureau (SCB) on behalf of the body charged with transport policy analysis (Trafikanalys – Transport Analysis),[19] broadly follows the US model described earlier. It is questionnaire based (online), seeking information on goods sent (plus imports), partly seeking all flows from major firms in certain sectors, and partly sampling smaller firms. It is compulsory for those selected. Those surveyed are protected by confidentiality, as a result of which only the most general data is published. More detailed information appears to be made available to model developers, especially the official national 'Samgods' freight transport model.

In this survey, data is not collected directly or indirectly from transporters. Information gathered (and published) on mode of transport is derived from the goods owner/shipper commodity flow responses.

Data for commodity flows within Sweden is collected at the level of postcode (to and from); and for exports and imports, by place and country, along with the Swedish postcode of the importer/exporter.

The primary source of target firms is the SCB's business database. Actual workplaces are chosen, so that all workplaces of multi-workplace firms are in the pool for selection. The database already contains the postcode of the workplace, so the questionnaire asks only for the destination postcode. The workplace postcode covers the Swedish end of imports and exports, so only the foreign place information is collected. Larger firms are asked to provide information centrally for all their workplaces.

Apart from location, the principal variables are date, commodity type, value (of the goods, excluding freight and GST), weight (net of packaging), transport mode (or modes if more than one), dangerous goods, type of load (eg container), and industry sector of sender and recipient.

The sectors covered by sampling are minerals, manufacturing, wholesale, retail that covers mail order/remote trade, and cars. This is supplemented by full coverage of firms (using 'register data') in the logging, sugar beet, grain and meat industries, along with milk and some petroleum flows.

The sample is selected in three stages – the workplaces, then the weeks they report, then the shipments they report on. In total, 12,032 workplaces are surveyed and used as the base for estimating the total population of 23,000 workplaces. For workplaces, the survey is quarterly and different workplaces may be chosen each quarter. Each quarter, 3000 workplaces are sampled, with a cut-off (for small firms, in terms

19 See www.trafa.se. NB: not www.trafikanalys.se, which is a site selling website traffic-counting services.

of number of employees) and then stratification techniques are used to shape the sample. Stratification is on the basis of workplace size (in terms of employees), location and main commodity produced. The incoming data is checked, verified and corrected as required.

The second stage of the sample is to choose the period within the quarter that each participant reports on. These are 1–3-week periods (depending on the size of the workplace), evenly spread between workplaces so every week in the quarter is covered. If it is simpler for the respondent, the respondent can give data on more weeks than requested.

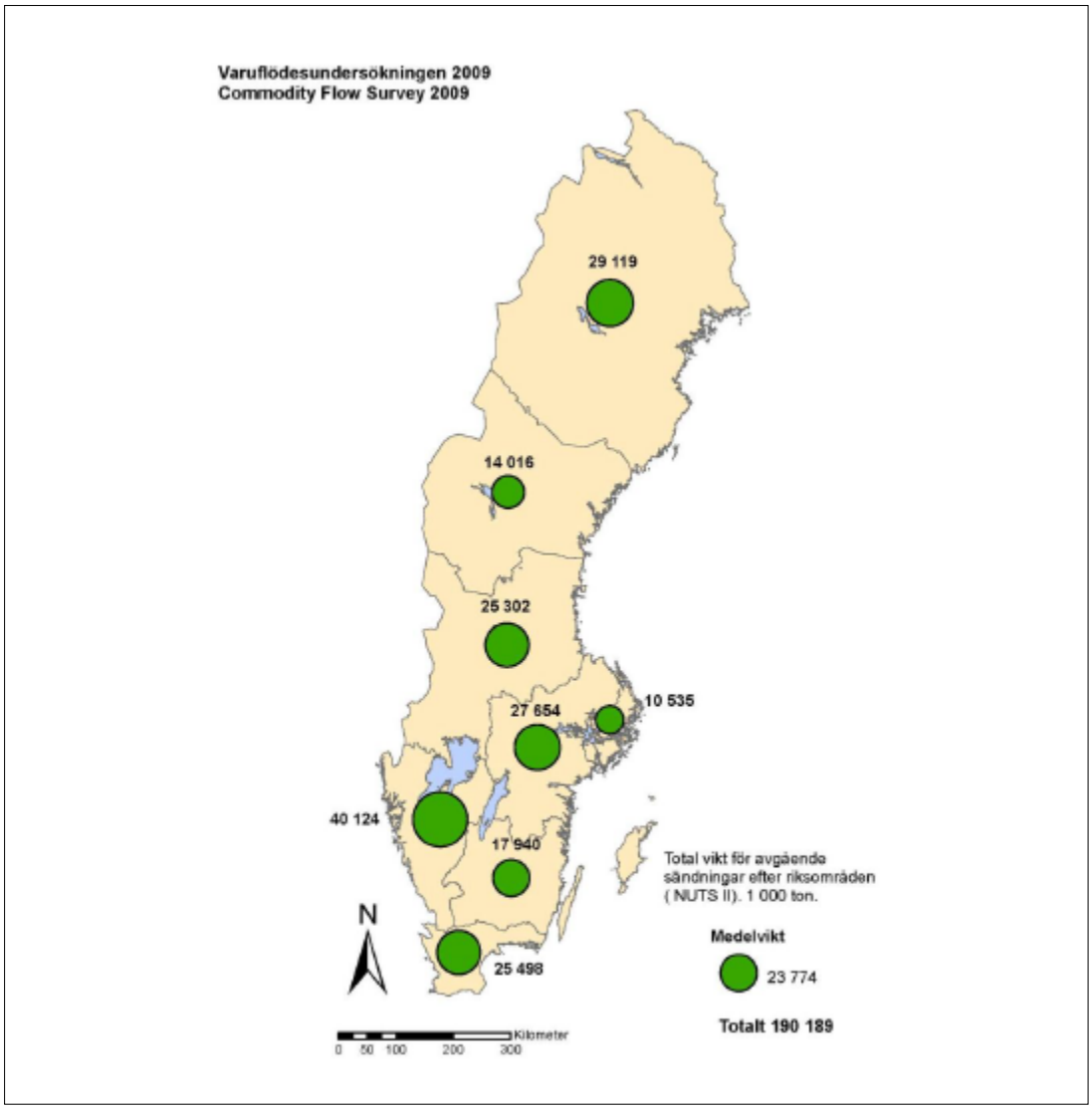
The third stage of the sample is for the workplace to systematically sample its consignments, so that for example, if there are 50 or fewer consignments for the period, all are sampled, if there are 500, every tenth consignment is sampled, and so on.

The survey is primarily online, either direct through a web questionnaire or through a spreadsheet blank on the SCB's website. A copy of this is provided in appendix C. A paper questionnaire is also used. There are written and telephone reminders, and the second written reminder includes a copy of the paper questionnaire.[20]

Published data includes overall commodity analysis, sector, mode of transport, regional breakdown of total weight and value sent, and import and export weight and value. There is no internal origin/destination data published, not even a broad region-to-region analysis, although this may be available on request for specific studies if confidentiality requirements are not breached. Samples of the output of the CFS are set out in figure 6.1 and tables 6.1–6.3.

20 Information drawn from the *Varuflödesundersökningnen 2009: metodrapport*, [*Commodity Flow Survey 2009: method report*], published in December 2011, and the English version of the same report for the 2001 survey, published in 2003.

Figure 6.1 Outgoing consignments 2009, by NUTS II[a] regions, by weight (000 tonnes) (Trafikanalys 2010)



a) NUTS II – A regional grouping that divides the EU into 270 geographical units.

b) Medelvikt – Average weight (by geographical area).

Table 6.1 Outgoing consignments 2009, by commodity groups (Trafikanalys 2010)

Varugrupp *Commodity group*	Vikt, 1 000 ton *Weight, 1 000 tonnes*	95 % konfidens-intervall *95 % confidence interval*	Värde, miljoner kr *Value, SEK million*	95 % konfidens-intervall *95 % confidence interval*
Produkter från jordbruk, skogsbruk och fiske	54 287	± 1 178	82 129	± 18 105
Malm och andra produkter från utvinning (ej jord, sten grus och sand)	12 543	± 423	9 024	± 457
Livsmedel, drycker och tobak	18 748	± 2 107	411 646	± 44 606
Trä och produkter av trä och kork	14 024	± 2 801	57 787	± 8 508
Papper och pappersmassa	15 854	± 1 678	114 981	± 10 082
Råolja, naturgas, kol, fasta och flytande bränslen inkl. tjära	21 238	± 1 005	89 072	± 4 398
Kemiska produkter (ej konsumtionsvaror, t.ex. läkemedel)	6 786	± 2 495	63 143	± 12 971
Jord, sten och byggmaterial	25 776	± 6 378	28 814	± 6 882
Metaller och metallvaror exkl. maskiner och utrustning	10 160	± 2 256	175 507	± 41 728
Högförädlade varor	10 774	± 1 315	800 224	± 53 931
Totalt	**190 189**	**± 8 524**	**1 832 328**	**± 85 693**

Sveriges officiella statistik

Commodity groupings in English:

- Products of agriculture, forestry, and fishing
- Metal ores and other primary and quarrying products (excluding soil, stone, gravel, and sand)
- Food products, beverages and tobacco
- Wood and wood and cork products
- Paper and pulp
- Crude oil, natural gas, coal, solid and liquid petroleum products including tar
- Chemical products (excluding consumer products, eg pharmaceuticals)
- Soil, stone, sand and building materials
- Basic metals and metal products, excluding machinery and equipment
- Highly processed goods.

Table 6.2 Outgoing consignments 2009, by cargo type (Trafikanalys 2010)

Lasttyp *Cargo type*	Vikt, 1 000 ton *Weight, 1 000 tonnes*	95 % konfidens-intervall *95 % confidence interval*	Värde, miljoner kr *Value, SEK million*	95 % konfidens-intervall *95 % confidence interval*
Flytande bulkgods	28 801	± 1 580	110 299	± 6 358
Fast bulkgods	39 152	± 6 539	43 131	± 8 520
Stora containrar, växelflak och andra utbytbara enheter, 20 fot eller mer	10 416	± 2 844	102 177	± 19 776
Andra containrar, växelflak och utbytbara enheter, mindre än 20 fot	820	± 696	21 303	± 9 961
Pallastat gods	42 075	± 3 430	1 068 512	± 62 218
Självgående mobila enheter	5 117	± 764	94 185	± 18 745
Andra mobila enheter, ej självgående	2 656	± 953	37 159	± 26 297
Andra godstyper, ej uppräknade ovan	58 230	± 1 539	302 885	± 33 577
Okänt	2 921	± 670	52 678	± 10 400
Totalt	**190 189**	**± 8 524**	**1 832 328**	**± 85 693**

Sveriges officiella statistik

Commodity groupings in English:

- Liquid bulk goods
- Solid bulk goods
- Large containers, swap bodies, and other transferrable units, 20ft or more
- Other containers, swap bodies, and other transferrable units, under 20ft
- Palletised goods
- Self-propelled mobile units
- Other mobile units, not self-propelled
- Other goods types, not counted above
- Unknown.

Table 6.3 Outgoing consignments 2009, by NUTS II[a] region and receiving area (Trafikanalys 2010)

NUTS II Region *NUTS II Region*	Sverige *Sweden*	95 % konfidens-intervall *95 % confidence interval*	Export *Export*	95 % konfidens-intervall *95 % confidence interval*	Okänt *Unknown*	95 % konfidens-intervall *95 % confidence interval*	Totalt *Total*	95 % konfidens-intervall *95 % confidence interval*
Stockholm								
Vikt[1]	8 985	± 1 299	..	± ..	..	± ..	10 535	± 1 531
Värde[2]	214 802	± 38 722	99 942	± 22 019	1 314	± 1 276	316 058	± 45 803
Östra Mellansverige								
Vikt[1]	22 216	± 2 546	5 373	± 1 744	65	± 37	27 654	± 3 436
Värde[2]	224 218	± 37 873	114 024	± 17 665	1 480	± 1 115	339 722	± 42 722
Småland med öarna								
Vikt[1]	13 609	± 1 227	4 229	± 1 133	102	± 145	17 940	± 1 772
Värde[2]	102 879	± 11 368	61 585	± 8 410	639	± 427	165 103	± 15 298
Sydsverige								
Vikt[1]	21 133	± 3 571	4 222	± 1 007	143	± 141	25 498	± 3 753
Värde[2]	194 159	± 24 929	129 676	± 43 179	3 239	± 3 022	327 074	± 50 848
Västsverige								
Vikt[1]	24 085	± 5 319	..	± ..	..	± ..	40 124	± 5 386
Värde[2]	231 793	± 28 616	179 826	± 16 231	2 141	± 843	413 760	± 34 753
Norra Mellansverige								
Vikt[1]	17 305	± 1 935	7 981	± 1 641	16	± 18	25 302	± 2 801
Värde[2]	68 272	± 9 014	89 572	± 15 270	273	± 329	158 117	± 18 961
Mellersta Norrland								
Vikt[1]	12 049	± 804	1 857	± 335	110	± 184	14 016	± 951
Värde[2]	26 727	± 5 896	18 419	± 3 199	213	± 216	45 359	± 7 458
Övre Norrland								
Vikt[1]	15 513	± 2 528	..	± ..	..	± ..	29 119	± 2 840
Värde[2]	43 281	± 6 421	23 503	± 5 233	352	± 515	67 135	± 8 969
Totalt								
Vikt[1]	134 896	± 7 611	54 666	± 3 167	626	± 288	190 189	± 8 524
Värde[2]	1 106 129	± 61 583	716 548	± 56 381	9 651	± 3 640	1 832 328	± 85 693

1) Vikt i 1 000-tals ton

2) Värde i SEK miljoner

Sveriges officiella statistik

a) NUTS II – A regional grouping that divides the EU into 270 geographical units.

Consigning areas (English translation):

- Stockholm
- Eastern Central Sweden
- Småland and islands
- South Sweden
- West Sweden
- Northern Central Sweden
- Central Norrland
- Upper Norrland

The costs of the most recent commodity flow survey amounted to about SEK8.5 million, equivalent to about NZ$1.5 million. The questionnaire is estimated to take about four hours to complete.

6.3 Other freight surveys

To satisfy the transport-based EU requirements for freight data, Trafikanalys conducts separate surveys each year, using paper questionnaires sent to the road vehicle owner and to the railway operators. It is setting up a web-based questionnaire for road but it is not yet in use.[21] The results of these surveys are not coordinated with those of the Swedish CFS, unlike the situation in the US.

Trafikanalys has also conducted a wider study of how statistics and knowledge of transport issues can be developed, what influences the choice of transport solution, factors limiting the development of effective freight transport, and also provides examples of good practice. The report sets out detailed analysis of internal and external transport flows, but the origin/destination analysis is not as comprehensive as that in the New Zealand NFDS 2008, as can be seen in figure 6.2 following.

Figure 6.2 Example of origin/destination analysis from Swedish freight data (Trafikanalysis 2012, p42)

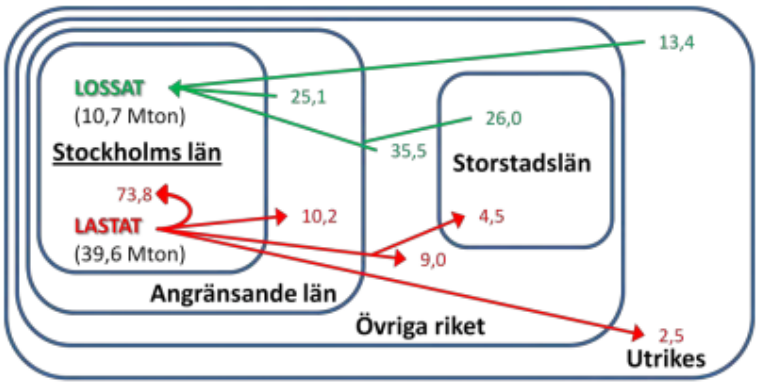


Figure 3.21. Total loaded and unloaded goods quantity in Stockholm County in millions of tonnes, with percentage shares of where the goods were sent to (red lines) and where they come from (green lines).

Notes:

1 Lossat: unloaded
Lastat: Loaded
Län: county
Angränsade län: neighbouring counties
Storstadslän: counties with (other) major cities
Övriga Riket: rest of the country
Utrikes: international

2 Note also the European convention of the comma as the decimal point.

3 Commentary: Total flows involving Stockholm: 50.3 million tonnes
Internal: 29.2 million tonnes (58.1%)
To and from neighbouring counties: 6.7 million tonnes t (13.4%)
Major city counties: 4.6 million tonnes (9.0%)
Rest of country: 7.4 million tonnes (14.6%)
International: 2.4 million tonnes (4.8%)

21 Fredrik Söderbaum (Trafikanalys), pers comm, 12 March 2013.

Conclusions from the study include the following:[22]

- Society depends on effective goods transport.
- Transport modes are complementary.
- Truck transport is most often short distance.
- The potential for shifting freight between modes can be limited.
- Foreign trucks dominate cross-border movements, but not overall movements.
- There are capacity and environmental problems in the main cities.
- Transport supply is limited in low-density and countryside areas.
- Goods transport influences the achievement of the formal transport policy goals.
- Knowledge of goods transport is not comprehensive.

A similar survey to the CFS has been conducted in Norway, without import and export traffic, and without modal information. Selected major industry sectors were covered with data published by sector rather than by commodity. Data is published on an origin/destination basis, at a regional level, for total tonnes and value of goods (ie without sector breakdown). Statistics Norway, which carried out the survey, notes the usefulness of the data in terms of transport modelling, which is in turn important for the National Transport Plan.[23]

22 www.trafa.se/sv/Projekt/Regeringsuppdrag---avslutade/Godstransporter/. Accessed 30 June 2013.

23 See www.ssb.no/vis/magasinet/analyse/art-2010-11-23-01.html. Accessed 30 June 2013.

7 Freight data collection in New Zealand

7.1 National freight data collection

7.1.1 Introduction

In New Zealand there is only limited freight data available in the public domain at a national level. The data currently available includes:

- the Transport Monitoring Indicator Framework (TMIF)
- NZ Transport Agency traffic counts
- Freight Information Gathering System (FIGS)
- KiwiRail Annual Reports – more detailed information on rail movements is now being included in FIGS
- National Freight Demands Study (NFDS)
- data on the volumes of international trade, by commodity and port. This has no information on inland origins/destinations. Some outline information on international trade is now included as part of FIGS.

7.1.2 The Transport Monitoring Indicator Framework (TMIF)

The Transport Monitoring Indicator Framework (TMIF) (MoT 2011) provides data on a wide range of transport topics. This includes the following four areas (with the associated category numbers) that are related to domestic freight movements:

- freight tonne-km growth (road, rail, maritime, aviation) - FT004
- total freight tonne-km (road, rail, maritime, aviation) - FT007
- freight tonne-km, by mode share - FT008
- freight tonne-km, by inter-regional mode share - FT009.

The first three of these are covered partially and the final item is not covered at all. Data on total freight movements by tonne-km at a national level, by road and rail, is based on information from road user charges (RUC) for the road component, and material published by KiwiRail for the rail component. Because of limited data on coastal shipping, statistics on the freight modal share are only available for a single year and are derived from the National Freight Demands Study (discussed below). Information on the freight tonne-kms by inter-regional mode share is reported as not available.

7.1.3 Rail data from KiwiRail annual reports

Other information on annual freight movements by rail, at a much aggregated level, is available annually in the KiwiRail annual reports. This is also incorporated into the TMIF, with a breakdown into three basic categories – bulk, containerised imports and exports, and other domestic traffic. Some data is provided by KiwiRail on the breakdown of the commodities carried, but the dimensions in which this is measured (eg

in terms of tonnes or tonne-kms) are not specified. More detailed rail data from April 2012 is now included in FIGS.

7.1.4 Road traffic counts

Comprehensive information on road traffic flows on the state highway (SH) network is also provided by the Transport Agency and published annually and provided on their website.[24] Less comprehensive information for selected count sites is published monthly. However, although the numbers of heavy commercial vehicles are listed, these include buses and coaches, which in urban and tourist areas can comprise a significant proportion of the heavy vehicle traffic. More detailed information on the flows of different sizes of vehicles is also available on request from the database but is not regularly published. Again, this does not distinguish between buses and other commercial vehicles of a similar size.

7.1.5 Freight Information Gathering System (FIGS)

A further data collection exercise (FIGS, the Freight Information Gathering System) was initiated in 2009/2010 by the MoT. This initially focused on the movement of containers by sea, covering both international and domestic movements, using data derived from the information collected by ports in relation to the use made of them.

The information provided in FIGS has recently been expanded to include Customs data on the value and volume of international traffic, rail flows on a regional basis with details of selected commodity flows, and also details on the coastal movements of refined petroleum products from the refinery at Marsden Point. FIGS therefore provides an umbrella for the collection of freight data from a number of sources, incorporating different methods of collection and analysis, but as yet does not attempt to link the different sources of data. Steps are being undertaken to extend the scope of FIGS to include other bulk coastal movements, and in addition the incorporation of road freight data is being explored.

The work in this study will therefore potentially complement FIGS by developing options for the collection of additional data, although challenges will exist in bringing this together to provide an accessible and comprehensive analysis of the current freight task.

7.1.6 Vehicle-tracking system databases

One of the Transport Agency's 'approved providers' of electronic road user charging systems collects GPS data on heavy vehicle movements as part of the national electronic road user charging system. This provider has made information from their database available to the Transport Agency on the patterns of heavy vehicle use detected by the GPS portion of the data. The framework and potential uses of this data are currently being developed.

This is discussed further in chapter 16.

7.1.7 National Freight Demands Study (NFDS)

The other main source of reasonably comprehensive information, albeit on a single-year basis for 2006-2007, is the National Freight Demands Study (NFDS) (Richard Paling Consulting et al 2008), which was

24 See www.nzta.govt.nz/resources/state-highway-traffic-volumes/ Accessed 30 June 2013.

undertaken for the MoT, Ministry of Economic Development and the Transport Agency in 2008. Using a wide variety of published and unpublished sources of information, this provided comprehensive estimates of the freight task within New Zealand in 2006-2007, by the three main modes of road, rail and coastal shipping, for approximately 17 commodity groupings. The information was disaggregated to a regional level. Detailed information was obtained on rail flows and bulk coastal shipping movements. Estimates were also made of other general cargo movements by coastal shipping.

Based on forecasts for the individual commodities, estimates were made of the freight task including possible modal shares in 2011, 2016 and 2031, with the latter attracting the most attention.

The information in the NFDS has been widely used by a variety of agencies[25] (including in the preparation of the TMIF) and has been particularly used by regional councils seeking to understand the situation in their areas. However, it is becoming dated, since much of the data on which it was based dates back to 2006 or 2007, before the current economic downturn.

7.2 National freight modelling

There have been some attempts to develop national freight modelling in New Zealand through, for example, the development a national freight matrix (Bolland et al 2005) and work looking at commercial vehicle usage and forecasting at a national level (Jewell et al 2007). Jewell et al's *Commercial vehicle usage and forecasting* study explored a number of approaches, which gave different results but did not reach any conclusions or provide a single set of estimates of the current freight task. The approaches investigated do not appear to have been taken further in any subsequent work.

Recently the Transport Agency commissioned a study for the development of a National Transport Demand Model, which would include freight elements. However, it is understood that this is being developed primarily as a synthetic model with a limited requirement for observed detailed freight data. At the time of this research, no outcomes were available from this work and the extent to which it would overlap or interact with our freight data collection study was therefore unclear.

7.3 Subnational freight data collection and modelling

Subnational freight data collection typically takes place at two levels. A number of regions within New Zealand have commissioned the development of regional or multiregional freight assessments, typically based on the NFDS but in some instances with the collection of some updated information primarily to determine how flows of major commodities have changed since the data collection included in the NFDS, or to paint a more detailed picture of local traffic flows. These studies have included work for Auckland (Paling 2009), Waikato (Paling and Carr 2009), Bay of Plenty (Richard Paling Consulting 2010a) and Canterbury regions (Richard Paling Consulting 2009) individually; and groups of regions including the Upper North Island (Richard Paling Consulting 2010b), Central North Island (Horizons Regional Council 2010, and Wellington, Nelson, Marlborough and Tasman regions (Hyder Consulting NZ Ltd 2009). In addition, tailored presentations have also been made to Regional Land Transport Committees (RLTCs) or officers groups in a number of regions, including Southland and Otago.

25 A Google search for 'National Freight Demands Study' on New Zealand websites indicates about 1500 references.

In parallel with the National Transport Demand Model, Market Economics have developed a freight flows model for the Transport Agency, covering the Upper North Island (Market Economics 2012), which has been used to assess the effects of different economic growth scenarios on transport demand. This has used a largely synthetic approach to build the base-year estimates and future-year forecasts, primarily derived from financial values from input-output tables and supply and use tables, which are then converted to commodity values by the application of typical prices per tonne and then disaggregated to give flows on the transport network. Material from the NFDS has been used to a limited degree in the calibration of this model. There are, however, issues with the use of synthetic models that attempt to include combinations of commodities with very different movement patterns and supply chains, and it has proved difficult to match the estimates of freight movements derived from the model with those observed.

A further step has been taken in the Bay of Plenty region, where several key freight users in the area, including Carter Holt Harvey, Fonterra and Zespri, have pooled their resources to assist their discussions with Government agencies. It is understood that this is being expanded to include logs and fuel, in order to provide a more comprehensive picture of freight in the area. The information put together is not currently publicly available, although it may be available on a confidential basis and could, for example, be used to check forecasts derived from other sources.

At a different level, detailed regional models have been developed for the major urban areas in New Zealand. Each of these includes a freight component and the work undertaken in Christchurch, which involved the use of GPS fleet-tracking data, is discussed more fully later in this report. However, these studies have typically been tailored to assess the situation in the key urban areas rather than region wide. GPS data has also been used to help identify trip length distributions for commercial vehicles.

7.4 Other potential data sources

A further source of data that could provide valuable information on freight movements in New Zealand, of which we have recently become aware, is the pallet hire database of a major supplier of hire pallets in New Zealand. In principle, this could provide information on the patterns of movements for commodities that are transported within the country on pallets. These would typically cover semi-manufactured, manufactured or processed goods before they enter retail distribution chains, where they are more typically carried in roll cages or similar. While this database exists, the extent to which information would be available to third parties is unknown. In addition, it is almost certain that if information was provided, the charge for this would be significantly more substantial than that required, for example, by Statistics New Zealand (SNZ) for the processing of their data. Nevertheless, it would fill a particular gap in the information on freight movements for commodities where there may be a large number of producers or importers, and where transport companies may not have detailed information on the commodities they carry.

The National Animal Identification and Tracing scheme (NAIT) also collects data on every movement of cattle or deer in New Zealand, apart from some local movements where farms are in common ownership. While it is primarily set up for biosecurity purposes, it is able to publish data where individual privacy is not compromised. NAIT's data collection methods would enable a comprehensive set of animal movement matrices to be developed, on a fine geographical base. Their data enables territorial local authority and even postcode units to be used as origins and destinations.

A number of independent, so-called '4th-party logistics' (4PL) operations have been set up to handle major flows of freight from one producer, or a limited number of producers, with the potential to expand their offering outside the main users. These firms may also be a useful source of statistics on freight flows.

8 New Zealand Productivity Commission report *International freight transport services inquiry*

8.1 Key findings from the report

Following the preparation of Technical Note 1 of the Ongoing Domestic Freight Volume Information Study (ODFVIS) in April 2012, the New Zealand Productivity Commission published the *International freight transport services inquiry* (2012). While (as the title suggests) this concentrated on international freight movements, it also considered the issue of collecting improved information on the movement of domestic freight to contribute to helping 'freight participants make better individual and joint decisions' and 'also help policy-makers design and evaluate policies and regulations' (section 13.3).

The need for improved freight data collection was supported by a number of those submitting evidence to the inquiry. These included the following:

- New Zealand Chambers of Commerce:

  > *We are aware of significant gaps in transport information and data, and in particular in respect of freight and other commercial vehicle numbers by category, freight volumes, purpose of commercial trips … Accordingly, we strongly agree that there needs to be a focus on statistical data collection of road/rail and sea freight volumes and categories … The bottom line is that for sensible, well informed infrastructure investment decisions to be made we need regular, timely and reliable data collection measures in place* (sub DR64, p7).

- Auckland Airport:

  > *Auckland Airport supports the Commission's view that additional information on freight movements in New Zealand that is collected and made available on a regular basis would have considerable value to key stakeholders in the value chain … Auckland Airport currently has little information on/visibility about air freight volumes including business volumes and forecast date. More access would only be positive, allowing us to better plan for the future requirements of the industry. Such access could be provided in a way that would ensure commercial confidentiality for individual companies* (sub DR79, p5).

- CentrePort Wellington

  > *The gathering of useful information which supports the government and participants in the supply chain to coordinate thinking is desirable as long as its use is clear* (sub DR94, p4).

The New Zealand Productivity Commission report considered the three main approaches to information gathering on freight - the National Freight Demand Study, the MoT's Freight Information Gathering System, and the Transport Monitoring Indicator Framework.

It noted that the NFDS was an important contribution to understanding trends in New Zealand's domestic freight volumes and values by product type, as well as inter-regional flows. However, the study was a one-off exercise and was mainly forward-looking from base year 2006-07. It required gathering a lot of

primary information. This highlighted not only the challenges in such information gathering, but also the lack of the necessary systems for ongoing collection.

At the time of the Productivity Commission report, the Freight Information Gathering System (FIGS) involved the ongoing collection of freight volume movements for containers moving by ship, either international or domestic, with some information on the land modes used to access the ports. The Productivity Commission report said that it:

> *... supports the intent of the Ministry of Transport's FIGS initiative including plans to expand it to look at bulk freight movements (and potentially look at the domestic supply chain in more detail). A proposal to extend FIGS should be developed, and should include a regulatory impact analysis that estimates the benefits and costs* (p267).

The report also went on to consider the issue of whether information gathering should be voluntary or mandatory, but did not reach any firm conclusions. Overall, the Productivity Commission recognised the importance of good freight data to support improved decision making in the freight sector. It was concerned about the costs of any mandatory collection of information, and in Recommendation 13.3, stated:

> *The Ministry of Transport should develop a proposal to extend the Freight Information Gathering System and subject the proposal to a regulatory impact analysis 'efficiency test', to determine whether it would deliver net benefits beyond existing information collection and dissemination.*

8.2 Response of the Government

The Government responded to the Productivity Commission's recommendations regarding the collection of freight as follows (NZ Treasury 2012):

> *5. Develop a richer information infrastructure*
>
> *The Government intends to develop more comprehensive systems for gathering and disseminating freight data in order to support better individual and co-ordinated decision-making, monitoring and policy development. In designing these systems, the Government will seek to minimise compliance costs imposed on the freight services sector.*

The Government recognised that there were benefits from enhanced data on freight movements. However, it also recognised that there were potential costs to the suppliers of this information and preferred this data collection to be undertaken in a way that made the maximum use of easily obtainable data, either already in the public domain or, where this was not available, possibly developed by firms for their own internal purposes.

9 Options for New Zealand

9.1 The importance of freight data collection

The analysis so far in this report has emphasised the need for good and comprehensive data as the basis for effective planning for the freight sector, particularly to the extent to which it supports economic growth. In a New Zealand context, the role of the sector is important in facilitating the movements of exports, which represent a substantially higher volume than imports. In many cases these are bulk or relatively low-value commodities for which transport costs may make a significant contribution to the costs of the goods at the point of export. The relatively low value per tonne of New Zealand exports are set out in table 9.1.

Table 9.1 Volume and value of New Zealand exports and imports 2012 (Source: Extracted from special tabulation provided by Statistics New Zealand)

	Volume (m tonnes)	Total value ($bn)	Value per tonne ($)
Exports	34.7	48.3 (fob)	1389
Imports	20.1	47.0 (cif)	2336
Total	54.8	95.3	

fob free on board, including the costs of inland transportation to the port and loading onto the vessel

cif includes carriage, insurance and freight

Good information on the freight sector gives an accurate representation of the current patterns of movements and also provides a sound basis for planning for the future. This needs to take into account a broad range of considerations within the transport sector, including both the provision of infrastructure such as roads, railways and ports (which are typically undertaken by bodies within the public sector) and also the use that will be made of these by enterprises within both the public and private sectors.

The importance of the freight sector has been increasingly recognised by the Government and by agencies with potential responsibilities in this area, such as the Transport Agency. Freight has been a major interest of the Upper North Island Strategic Alliance, a grouping of local authorities in the upper North Island, and other instances of such partnerships are found elsewhere in the country.

While data on freight is recognised as important, as indicated in chapter 7 there is currently only limited information on the performance of the freight sector as a whole in New Zealand. The NFDS, which provides the most comprehensive picture of freight movements in the country, was published in 2008 before the full effects of the global financial crisis were really felt, and there have been substantial changes in the patterns of freight movements in response to this. Some attention has been placed on obtaining information on port-related traffic and inland rail movements through FIGS, developed by the MoT, but this only covers a relatively small part of the total freight transport market in New Zealand.

It is against this dearth of current information on freight transport movements that the present study was initiated. In undertaking this work we investigated the potential offered by developments in technology, including GPS or other vehicle-tracking systems that potentially can provide information that is not otherwise available. We also investigated the potential offered by advanced electronic management information systems, which may be integrated with GPS and which allow information to be extracted more readily from the records held by firms for the management of their operations.

9.2 Proposed general guidelines for freight data collection in New Zealand

A wide number of players, including those involved directly in the industry and agencies that have a broader monitoring role, potentially collects information relevant to the freight sector. The organisations that are directly involved include:

- producers or shippers of commodities, including intermediary firms such as 4PL providers
- the firms transporting commodities
- organisations monitoring freight movements for non-transport purposes (eg NAIT)
- those managing the infrastructure that freight services of any form use (eg ports, road controlling authorities, etc).

There are also a number of agencies with a broader monitoring role who collect and may publish statistics, typically from producers. These include agencies such as the Ministry for Primary Industries, which publishes a range of statistics on agricultural production; the Ministry of Business, Innovation and Employment (MBIE), which publishes information on mineral production; and SNZ, which has a more general role.

Experience from overseas indicates that information is typically collected from a range of sources, combining sample surveys with more complete data for other sectors. This in effect forms a hybrid approach that in practice has two main features:

- It combines the collection of data from producers with that from transport companies.
- It seeks to get the data where it is already available and from those who are most easily able to provide it. It therefore involves assembling information from a wide range of sources, which then needs to be collated within a consistent framework.

In New Zealand much of the freight task consists of the movement of basic commodities such as liquid milk, aggregates and logs, which represent about 40-50% of the freight task when measured in terms of the tonnage transported. These are typically low-value commodities which, in general, have fairly simple distribution patterns and for which a considerable degree of information is available either directly or indirectly from the producers. In practice, therefore, the hybrid approach proposed would have a substantial focus on data from producers (and those receiving the goods) who are able to supply information on the complete (or largely complete) patterns of production and use. A lower weighting would be attached to information from transport operators, from which more piecemeal information on commodities is available, reflecting only the particular services that they provide.

However, it is recognised that while this would be the case for many commodities (and in our analysis later in the report we identify for which of these it is likely to be appropriate), in some areas this approach may not be suitable. This would be the position where there are large numbers of producers and receivers, and where distribution patterns are more complex, and for these a greater weighting may have to be placed on information from transport operators or more synthetic approaches to estimation. A particular issue arises in cases where there are no control totals on the volumes of goods moved and for these, more indirect methods of estimation would be required. Wherever possible, the approach should seek to gain information from those who can supply it most readily.

10 Defining the data to be collected in New Zealand

10.1 Introduction

Having examined the approaches taken in a range of countries, including New Zealand, a number of possible options for future data collection have been identified. In considering these, the assumption has been made that these would, at the minimum, provide a baseline picture of the freight sector. There are a various ways in which this baseline might be defined and these are considered below, before developing possible future options for data collection. In developing these future options for New Zealand, it would be important to recognise the specific characteristics of the freight task in the country and the extent to which this is dominated by the movement of basic commodities rather than manufactured goods.

There is also an issue regarding the extent to which this information is to be made available publicly, either without charge or with payment for the analysis of existing databases (as, for example, is the case for data held by SNZ), and the extent to which it is limited to specific organisations or is released under specific confidentiality constraints.

Before considering the options, it is useful to recap the information that is currently available from the data collection exercises for the countries considered earlier. This is considered in broad priority order in terms of:

- commodity
- origin and destination
- mode
- type of vehicle
- cargo type (also known as mode of carriage or mode of appearance)
- route.

The section below then considers possible ways in which data might be collected, before developing some possible freight data collection options to be considered further in the next stages of the study.

10.2 Summary of data from existing freight data collection exercises

10.2.1 Commodity definitions

There are a number of approaches taken to defining commodities for combined assessments of the freight sector. The details of the various definitions in the countries we examined are listed in table 10.1. Because of the different definitions used it has not been possible to provide an exact alignment between the categories in the countries examined.

Table 10.1 Freight data collection in selected countries: commodity definitions: major surveys

NZ	Australia	US	UK	Sweden
NFDS	Survey of Motor Vehicle Use	FAF[3] output	CSORGT and Coastal Shipping Survey	CFS
Data collected as below	Data collected as below	Data collected in more detail but reported as below	Data collected in more detail but reported as below	Data collected in more detail but reported as below
Liquid milk	Food and live animals	Live animals and fish	Agricultural products	Products of agriculture, forestry and fishing
Manufactured dairy products	Beverages and tobacco	Cereal grains	Beverages	Ores and other mining (not earth, sand and gravel)
Export logs and woodchips	Crude materials, inedible, except fuels	Other agricultural products	Other foodstuffs	Food, beverages and tobacco
Logs to sawmills	Mineral fuels, lubricants and related materials	Animal feed	Wood, timber and cork	Wood and products of wood and cork
Sawmill production	Animal and vegetable oils, fats and waxes	Meat/seafood	Fertiliser	Pulp and paper
Pulp and paper	Chemicals and related products n.e.s.[a]	Milled grain products	Sand, gravel and clay	Crude oil, natural gas, coal, solid and liquid fuels, including tar
Board mill inputs and outputs	Manufactured goods	Other foodstuffs	Other crude minerals	Chemical products (except consumer goods eg pharmaceuticals)
Export meat	Machinery, transport equipment	Alcoholic beverages	Ores	Earth, stone and building materials
Livestock	Miscellaneous manufactured articles	Tobacco products	Crude materials	Metal and metal products excluding machinery and equipment
Horticultural products	Tools of trade	Building stone	Coal and coke	Highly processed products
Aggregates	Other commodities n.e.s.	Natural sands	Petrol and petroleum products	
Coal	Unspecified	Gravel	Chemicals	
Oil and petroleum products		Non-metallic minerals	Cements	
Steel and aluminium		Metallic ores	Other building materials	
Limestone, fertiliser, cement and concrete		Coal	Iron and steel products	
Other minerals		Crude petroleum	Other metal products n.e.s	
Retailing		Fuel oils	Machinery and transport equipment	
Couriers		Coal n.e.s.	Miscellaneous manufactures	
Other n.e.s.		Basic chemicals	Miscellaneous articles n.e.s	
		Pharmaceuticals		
		Fertilisers		
		Chemical products		
		Plastics/rubber		
		Logs		

NZ	Australia	US	UK	Sweden
		Wood products		
		Newsprint paper		
		Paper articles		
		Printed products		
		Textiles/leather		
		Non-metal mineral products		
		Base metals		
		Articles - base metal		
		Machinery		
		Electronics		
		Motorised vehicles		
		Transport equipment		
		Precision instruments		
		Furniture		
		Misc. manufacturing products		
		Waste/scrap		
		Mixed freight		
		Unknown		

a) n.e.s. = not elsewhere specified

The table indicates the range of approaches to the definition of commodities that have been taken in the five countries. The overseas countries where completion of the survey is mandatory allow for the collection of commodity data at a detailed level and in a way that corresponds, to a greater or lesser degree, with standard international classifications.

Where data collection is not mandatory (eg in New Zealand for the NFDS or for the annual rail data in the TMIF, and for rail data elsewhere), a different set of commodity breakdowns is reported based on the information that can be accessed. For the NFDS, these were driven by the availability of information from published data and key stakeholders, with an estimate available of the total road freight task, which was used as a balancing factor. The rail data in the NFDS was made available by the rail operator at a detailed level but was only published at an aggregated level. This mirrors typical experience overseas, where rail data tends to be supplied for public use only at a more aggregated level and the commodity definitions tend to be much broader. In part, this possibly reflects concerns about confidentiality, and in part, issues with the existing methods of collection of data by the rail companies.

As indicated, the commodity definitions included in the NFDS provide a potentially feasible way forward, although the agreement of the key stakeholders to provide this information on a regular basis would be required. Further definition would be useful within the 'Other n.e.s.' category.

10.2.2 Origins and destinations

The different approaches taken to the treatment of origins and destinations in the different countries are summarised in table 10.2.

Table 10.2 Freight data collection in selected countries: definitions of origins and destinations in published data

NZ	Australia	US	UK	Sweden
NFDS	Survey of Motor Vehicle Use	FAF[3] output	CSORGT	CFS
14 regions	States (modelled from data collected)	153 zone system based on key metropolitan areas and the remainders of states	Government Economic Regions and FMC (16 areas)	8 regions or 20 counties
	Capital cities/other major cities/rest of state (modelled from data collected			
	Rail data	**Rail data**	**Rail data**	
	State	Classified by business economic areas, 172 groups of counties for origin and destination, and states for junction points	Typically not disaggregated by origin or destination	
			Coastal shipping	
			16 port areas	

With the exception of the US, data is reported at a fairly broad geographical level, typically covering only 10-20 areas. However, for the UK and Sweden, information is collected at a more detailed level. It could therefore in principle be provided at a finer level of detail, although because of the relatively small sample size the statistical reliability of this would be limited and it could raise confidentiality issues. By way of contrast, in Australia information is collected only on a broad geographical basis.

In the case of the hybrid approach developed in New Zealand for the NFDS, and possibly elsewhere where information is brought together from a range of sources, the level of geographical disaggregation will depend on the availability of supporting statistics that are used to help build up the overall freight position. For the NFDS, standard local government regions were chosen as an appropriate level of geographical disaggregation, since a fairly wide range of general statistical data is readily available at a regional level. The use of regions also provided opportunities to match the estimated road vehicle flows with those observed, which would have been difficult or impossible at a greater level of disaggregation, especially within the major metropolitan areas.

10.2.3 Modes

The modes reported for national freight data collection typically focus on road, rail and coastal shipping, reflecting the ways in which the data is collected and typically the very small volumes transported by air. Intermodal traffic that uses more than one mode (as distinguished from the definition in Australian freight statistics, which is simply non-bulk traffic) is normally not counted as a separate item, but the constituent legs may each be counted separately if the analysis is based on information from transport providers rather than shippers. However, the US and Swedish data that is collected from shippers includes categories reflecting the use of more than one mode and also identifies the commodities transported intermodally.

10.2.4 Type of vehicle

Both the UK and Australian data, which is collected from truck drivers, also distinguishes movements by size of vehicle, the Australians distinguishing between rigid and articulated trucks, and the UK data going into more detail by vehicle type and also distinguishing between different sizes of vehicle within these categories. While the data is not published at a detailed level, it would presumably be possible to indicate the typical sizes of trucks for particular commodities, although this data would be subject to issues of statistical reliability.

In addition, because the British survey asks about specific movements, it is also able to consider issues such as whether the load is constrained by weight or volume, and the extent of empty running. The Australian data provides information on average loads.

10.2.5 Mode of carriage/mode of appearance

For the road transport survey (CSORGT) in the UK and the Swedish CFS, information is collected on the way the cargo is transported - bulk, container, pallet, etc. The definitions used are set out in table 10.3.

Table 10.3 Freight data collection in selected countries: definitions of cargo type (also called mode of carriage or mode of appearance) in published data

UK	Sweden
Large freight container (incl. ISO)	Liquid bulk cargo
Other freight container (incl. stillages)	Solid bulk cargo
Palletised	Large containers, swap bodies and other replaceable units, 20ft or more
Pre-slung	Other containers, swap bodies and other replaceable units, less than 20ft or more
Bulk	Palletised goods
Roll cages	Self-propelled mobile devices
Other	Other mobile devices not self-propelled
	Other types of goods not listed above
	Unknown

The definitions are slightly different because of the different targets for the survey. The UK data is derived from the survey of road transport operators and by definition only covers goods transport by trucks, whereas the Swedish data includes all consignments moved, including those that are self-powered or otherwise mobile.

10.2.6 Routes

In the national freight data collection exercises for the selected countries, the detailed routes used for the movement of freight are currently either not considered or are estimated from some form of modelling exercise, as is the case in the US and in the unpublished models in the UK. The focus of the NFDS update currently being undertaken is on broad inter- and intra-regional movements and not on the exact route selected (although in practice, in many instances there is little choice). In line with the approach generally taken elsewhere, it has not therefore been progressed further.

10.3 Data collection for New Zealand

10.3.1 Introduction

Having reviewed the approaches developed overseas for the collection of freight data and also taken into account the particular characteristics of the freight task in New Zealand, with its heavy focus on the movement of basic commodities, we have developed what we believe to be appropriate structures for the collection of freight data with respect to:

- commodities
- origin and destination
- mode
- volume or weight.

These are set out in the following sections.

10.3.2 Commodities

The proposed commodity definitions that it would be desirable to apply to form the basis of the data collection are set out in table 10.4. This sets out what we consider to be the best structure, aiming to strike a balance between the value of the information to be collected and its ease of collection, and expands on that used for the NFDS. Ease of collection is a particular issue for some agricultural products and manufactured goods, since readily available information on these (both in total and in detail) is very limited, but some degree of disaggregation is probably desirable, to facilitate the estimation of the tonnages transported and to act as a base for future forecasting.

It should also be noted that although data may be collected on a detailed commodity basis, it may not be possible to publish this information because of confidentiality concerns. Although unpublished, the disaggregated data would assist in understanding current transport patterns and developing future forecasts, although it would need some aggregation. An example of this in the NFDS was the combination of limestone, fertiliser, cement and concrete, where although only the aggregated totals were released at a regional level, the disaggregated information was used to build up the overall patterns both for current flows and those forecast for the future.

Table 10.4 Proposed commodity breakdown

Agricultural products

• Live animals
• Meat and edible offal
• Fish and sea food
• Liquid milk
• Manufactured dairy products:
  - Non-perishable dairy products
  - Perishable dairy products
• Edible vegetables
• Edible fruit and nuts
• Cereals
• Other agricultural products

Other food products
• Beverages, spirits and vinegar • Other food products
Mineral products
• Aggregates • Limestone • Cement • Coal • Petroleum • Concrete • Other mineral products
Chemical and allied products
• Fertiliser • Other chemical and allied products

Logs and timber products
• Whole logs • Woodchips • Sawn and shaped timber • Timber board and plywood • Other timber products • Pulp of wood • Paper, packaging and printed goods
Plastics, textiles and leather
• Wool • Other plastics leather and textiles
Metal goods and articles
• Aluminium and articles of aluminium • Iron and steel, and articles of iron and steel • Other metals and articles
Manufactured goods

• Distribution in retail chains:
  - Supermarkets
  - Other retail
• Other goods:
  - Vehicles
  - Other manufactured goods

Waste
• Municipal collection • Liquid • Excavation and demolition • Other waste

10.3.3 Origins and destinations

While it is anticipated that any material would be published at a regional level, it would be useful to understand in more detail the distribution of key freight flows within regions where this can be readily obtained. As a consequence, we propose that where possible, information should be collected at a territorial authority (TA) (district or city) level, except in Auckland where the following breakdown is proposed:

- Auckland North — former North Shore City and Rodney
- Auckland West — former Waitakere City
- Auckland Central — former Auckland City
- Auckland South — former Manukau City, Papakura and those parts of the former Franklin District that remain in the Auckland Region.

If possible, movements to and from ports would also be identified separately.

For the suppliers of information, aggregations of information within regions would be acceptable where volumes are small. Other breakdowns (eg based on postcodes or other area definitions that can be readily translated into the TAs) would be acceptable.

10.3.4 Modes

These would include:

- road
- rail
- coastal shipping
- air (although the volumes of this are likely to be small)
- and if possible, combinations of modes:
  - road/rail
  - road/coastal shipping.

11 Options for collecting data

11.1 General categories of data collection

Having defined the data that it would be desirable to collect, the next step is to outline the different ways this data might be gathered. Taking into account the ways in which data is currently collected or might be collected in the future, possible approaches for future data collection on a regular and ongoing basis could include the following:

- *Analysis of publicly available statistics*: This could include material from SNZ (either published or available for purchase) as well as from other agencies such as the Transport Agency, MoT (through the TMIF and other publications), and KiwiRail (through their annual report), and more general commodity information from organisations such as the Livestock Information Council, the NZ Forest Owners Association, and Crown Minerals, which publish regular statistics of production of key commodities.

  Some of this information can be accessed without charge. However for some analyses (particularly more complex information that might be required from SNZ), a charge may be made, although these charges, which are intended to cover the costs of processing the data rather than its collection, tend to be fairly modest. Other agencies may levy a more substantial charge.

- *Regular voluntary information from key freight stakeholders*: This should be in an agreed format and aimed at providing information on their total freight movements over a period of time, probably annually. This approach could be adopted for both the producers of goods and those transporting them, although given the nature of the freight task in New Zealand, attention should be focused on producers. This would aim to build on and formalise the approaches taken in the NFDS and as far as possible, would be collected in a readily repeatable format.

- *Other public and private sector agencies:* Although not available previously, useful information may be available from other public and private sector agencies, including the National Animal Identification and Tracing scheme (NAIT), and a major pallet database (discussed in chapter 7). The arrangements for receiving data would have to be negotiated and may include a charge both for the collection of the data itself as well as its processing into an appropriate form. However, it is possible that a suitable arrangement could be developed to allow this data to be made available on a regular basis.

- *Direct sample surveys of key components of the freight sector*: This could be either by commodity flow survey (eg as in the US and Sweden) or by a survey of transport companies (eg as in the UK or Australia). To be effective they would have to be mandatory.

- *Direct supply and analysis of electronic data on vehicle and/or commodity movements from producers or transporters.*

In practice, the most appropriate way forward is likely to be a hybrid methodology combining two or more of these approaches.

The issues associated with each of these approaches are considered in the sections below.

11.1.1 Regular information from key freight stakeholders

Advantages:

- Data collection may be relatively inexpensive, particularly where suppliers represent a major part of commodity production as, for example, in the case of dairy products.
- There may be a greater depth of data provided, which may include totals for each operator, rather than just a small sample.

Disadvantages:

- It may be difficult to get data in the form required because the data provided will be derived from the individual information systems of operators.
- Operators may be reluctant to provide information to the timetable required by the freight data collection agency.
- There may be costs associated with chasing data and with analysis into a common format.
- There may be areas where no key stakeholder can be easily identified.
- There may be challenges in grossing up totals from individual respondents to a national total.
- Data may be limited because of confidentiality concerns.

11.1.2 Purchase or acquisition of data from third-party operators

Advantages:

- This may provide insights into areas where other data is not available.
- This may be able to get data in a form that is readily usable for incorporation into the overall freight data collection process.

Disadvantages:

- The costs of data may be substantial.
- Concerns about confidentiality may limit information that can be provided.

11.1.3 Direct sample surveys – Commodity Flow Survey

Advantages:

- In terms of the data to be collected and its format, this would be under the direct control of the commissioning agency.
- The frequency of the survey would be under the control of the commissioning agency.
- This provides a common approach to freight by all modes.

Disadvantages:

- This would require high-level authorisation to conduct the surveys.

- This may attract resistance from potential respondents (but because producer firms are regularly surveyed for economic data, this resistance could be less for a commodity flow survey than if it was a direct survey of transport operators).
- This may be relatively expensive to undertake because of the need to code and analyse the data collected.
- There may be issues with statistical reliability if there is a desire to collect a wide range of information to be cross-tabulated - the US CFS is supported by a wide range of other data collection and analysis.
- This may be an inefficient or ineffective way of collecting data on particular types of movements, especially where other alternative data sources exist or where substantial flows are generated by a large number of small units (eg milk and possibly forestry).
- Although the approach used in the US does not cover imports, the approach used in Sweden has been extended to include these by asking respondents for information on both outgoing movements and imports.

11.1.4 Direct sample surveys – transport operator surveys

Advantages:

- In terms of the data to be collected and its format, these would be under the direct control of the commissioning agency.
- The frequency of the survey would be under the control of the commissioning agency.
- These can potentially cover all activities by modal units, including commodities not easily handled by the CFS.
- These can be used to collect additional information on operation of modes (fuel consumption, empty running, etc).

Disadvantages:

- If done as a survey of road vehicle operators, this would require high-level authorisation to conduct the surveys - although roadside surveys could be an alternative for road vehicles.
- This may attract resistance from potential respondents, especially from smaller operators.
- This may be relatively expensive to undertake because of the need to code and analyse the data collected.
- There may be issues with statistical reliability if there is a desire to collect a wide range of information to be cross-tabulated.
- This may be an inefficient or ineffective way of collecting data on particular types of movements, particularly for rail and coastal shipping.

11.1.5 Direct supply and analysis of electronic data on vehicle and/or commodity movements

Advantages:

- Data can be provided very promptly.
- By having direct access to data, the potential for delay by other parties may be limited.
- The ongoing costs of data collection may be small.
- Depending on the data source, it may be possible to provide very detailed and complex data, including vehicle routing.

Disadvantages:

- Concerns about confidentiality of data may limit the data that can be made available.
- There may be issues about getting data into a common format if it is derived from a number of sources.
- There is potential that a high proportion of freight would be classified as general traffic, with no detailed commodity breakdown.
- Initial set-up costs may be substantial.
- The data available may cover only part of the freight task and may not be representative of activities as a whole. As a result, it may be challenging to gross up to appropriate totals.

11.2 General considerations

Approaches overseas typically include the mandatory involvement, in at least one component of the surveys, of producers or transport companies. However, it is recognised that even though they are mandatory, a degree of non-response is typically experienced, even after fairly strenuous efforts to collect the data. This level of non-response can amount to 20% or more. An analogy with this is the census of population in New Zealand, where despite a mandatory requirement to complete the form and extensive action by field staff to obtain the data, a less-than-full return of 96% was achieved in 2006.[26]

In considering the potential use of mandatory surveys, the current climate in New Zealand has to be considered. We understand from discussions with Government agencies that there is little appetite for mandatory surveys at present in New Zealand, an opinion that was reinforced by the Government's response to the New Zealand Productivity Commission's 2012 report (see section 8.2). While in principle the Statistics Act gives the Government the powers to collect data on the freight sector, these depend on convincing the appropriate Minister of the need for these, and the recent statements indicate that at this time, this may not be an appropriate way forward. It should also be noted that undertaking and managing surveys can be expensive, especially if substantial follow-up activities are necessary to achieve an acceptable response rate.

26 SNZ website. Accessed 24 Feb 2013.
www.stats.govt.nz/Census/about-2006-census/information-by-variable/ethnicity.aspx

The focus of the proposed approach is therefore on persuading firms and agencies that they should contribute to the overall freight picture. While this may result in a fairly patchy response, especially for the road transport industry, our experience from the NFDS was that given a sufficiently high profile and purpose for the work from the sponsoring agency, a reasonable response could be achieved, and we believe that this support would be vital for the most effective collection of freight data. If the purpose is seen by respondents as giving value, then the response is likely to be greater. This would be reinforced by the wide use and acceptance of the 2008 NFDS. The repeatability of the process would be assisted by encouraging firms to provide the information on a regular basis and by documenting the processes used to analyse this, which in many instances builds on the approaches developed for the initial NFDS and set out in its report.

An issue with the hybrid approach involving the assembly of data from a number of sources is that although the data is relatively easy to collect, a degree of effort is then required to put this all on a common base. The approach effectively shifts effort from those providing the data to those entrusted with its analysis. A perfect survey would, in principle, require a limited effort to clean the data and place it on a common basis for analysis, whereas the more pragmatic approach outlined above would require more effort to clean the data. In both cases, however, it needs to be recognised that the data collected from surveys would only cover part of the overall freight task. There would need to be work put in to combining it with information derived from other sources, covering, for example, different modes or different categories of producers outside the scope of the initial analysis. As an example, for the US CFS, considerable effort is devoted to converting the data derived from the survey itself into the information required to provide an appropriate database for freight planning, even at a fairly coarse level, as well as having to supplement it with information on important commodities that are outside the scope of the CFS.

12 Possible frameworks for future freight data collection

Having examined the data that might be collected and the different general approaches its collection, possible ways in which these might be combined to produce frameworks for future freight data collection have been defined. These comprise:

- Option 1 A simple update of the NFDS from published sources
- Option 2 Extend option 1 with updated stakeholder data
- Option 3 Option 1 + formal transport survey
- Option 4 Option 1 + formal commodity flow survey
- Option 5 Option 2 + direct electronic data capture for road transport
- Option 6 Electronic data collection + other data collection as appropriate.

These are described in more detail in tables 12.1-12.6. These would all, to some extent, build on the existing sources of data, including that currently collected by FIGS (option 1). Some of the options (2-5) would take into account the plans for Phase 2 of FIGS, which would extend this to cover all import/export traffic and coastal shipping and rail. In all of these, FIGS could provide an umbrella under which information of different types and from different sources could be brought together. In particular, these assume that a comprehensive picture of freight movements would be built up, combining a number of different approaches and sources of data that would need to be incorporated into a common framework.

Table 12.1 Option 1 - simple NFDS update

Brief description	An update of the NFDS based on published and accessible data only.
Sources of data	• Aggregate totals for road and rail transport from the TMIF • Traffic count data from Transport Agency counts, to estimate regional growth factors • Coastal shipping movements from FIGS data • Rail freight movements from FIGS data • Port data, by commodity, from SNZ • Retail expenditure data from SNZ • Concrete production from SNZ • Port traffic from published statistics to provide alternative estimates of domestic coastal traffic if available (particularly for bulk commodities not currently in FIGS) • Published figures on: - liquid milk production - log harvesting and use of timber in different ways (Ministry for Primary Industries and possibly New Zealand Forest Owners Association websites) - aggregate production (Crown Minerals) - coal production (Solid Energy or Crown Minerals websites) - cement and petroleum movements, by sea, from port data - horticultural production - fertiliser use - meat production

Table 12.2 Option 2 - Extend option 1 with updated stakeholder data

Brief description	Extend option 1 with expanded data from stakeholders where available
Sources of data	• Published information from public sources as in option 1, including FIGS data for coastal shipping • Engagement with industry to update movements for particular commodities (eg milk and dairy products, logs and timber products, cement, coal, distribution of petroleum from Marsden Point, etc) where public information is not available, and for particular modes (rail, coastal shipping) on a regular and predefined agreed basis if not available via FIGS • Investigate data on movements of livestock from NAIT • Attempt to get oil products distribution from oil companies or Local Authority Petroleum Tax • Attempt to get data on road transport movements of general cargo, and if possible other movements, on an agreed basis. Development of a preferred option for the data to be provided, but prepared to accept data in a similar form if this can be produced more easily by respondents • Some development of synthetic models for specified sectors where other data not available or difficult to obtain cost effectively • All information is supplied by public reports or reports from owners of data. No direct tapping into, or analysis of, live data sources except via FIGS
Other comments	• No formal survey data • Retains NFDS structure (largely based on commodities) but provides updated relationships and helps fill gaps

Table 12.3 Option 3 - Option 1 + formal transport survey

Brief description	If option 2 does not, in practice, provide a reliable way of getting information on the total movement of goods by road, option 3 aims to overcome this with a survey of road goods traffic, to provide a more systematic approach to understanding these movements. This could probably be extended to get more insight into the nature of the road transport industry, along the lines of the UK and Australian studies. An alternative to a survey of road goods vehicle operators would be a comprehensive series of roadside interviews. This would supplement (but not replace) the data gathering as in option 1.
Sources of data	As for option 2, including inputs from key stakeholders, but with a survey of the movement of heavy goods vehicles as per the UK CSORGT - possibly only done periodically (eg every 3 years).
Other comments	To get a reasonable response, this would need to be mandatory, but possibly without penalty for non-response if a reasonable response (80% or so) could be achieved.

Table 12.4 Option 4 - Option 1 + formal commodity flow survey

Brief description	If option 2 does not, in practice, provide a reliable way of getting information on the movement of all goods, option 4 aims to overcome this with a commodity flow survey to provide a more systematic approach to understanding the movement of goods by all modes. This survey would supplement (but not replace) the data gathering, as in NFDS.
Sources of data	As for option 2, but with a survey of the movement of commodities by the shippers (and possibly) the receivers of goods to supplement the other sources of data.
Other comments	To get a reasonable response, this would need to be mandatory, but possibly without penalty for non-response if a reasonable response (80% or so) could be achieved. It could also be combined with the other firm surveys undertaken by SNZ and MBIE.

Table 12.5 Option 5 - Option 2 + direct electronic data capture for road transport

Brief description	If option 2 does not, in practice, provide a reliable way of getting information on the movement of goods by road, and information processed by road transport operators is not forthcoming or is inadequate, option 5 aims to overcome this by tapping directly into the electronic data already generated by operators' management information systems, to fill gaps particularly for road haulage. This could be obtained directly or through a third party to provide some screening of data to protect confidentiality.
Sources of data	As for option 2, but analysing existing sources of electronic data to get movements by road.

Table 12.6 Option 6 - Electronic data collection + other data collection as appropriate

Brief description	Use direct electronic data collection to generate as much data as possible and then fill gaps with other approaches, using a mixture of public information and approaches to key stakeholders. This represents a shift of emphasis compared with option 5, which uses electronic data collection to plug gaps.
Sources of data	ITS data for road from as wide a range of operators as possible, including both bulk transport and more general freight Rail and coastal shipping data from FIGS Commodity-based analysis for other sectors where electronic data from operators, etc, are considered to be deficient

13 Options for freight data collection - evaluation and possible way forward

13.1 Evaluation of the defined options

The preliminary evaluation of the options defined in the previous section is set out in tables 13.1-13.6.

Table 13.1 Option 1 - simple NFDS update

Brief description	An update of the NFDS based on published and accessible data only.
Advantages	• Totally under the collecting agency's control • No mandatory data collection • Can be completed fairly quickly and could provide the basis for an early update of NFDS or supplement to FIGS if ongoing monitoring of changes is possible
Disadvantages	• Would largely build on relationships identified in NFDS, but changes that may have occurred over time will not necessarily be picked up • Would not address particularly well the issue of the 'Other' traffic, although it may be possible to investigate other sectors; eg fish, horticulture, wool, etc • Need for integration of data from a range of sources, which would be in different formats
Robustness of results	• Limited since analysis depends on earlier flow patterns, which are likely to have changed
Potential for extension beyond basic framework as defined in section 10.3	• Very limited

Table 13.2 Option 2 – Extend option 1 with updated stakeholder data

Brief description	As for option 1, but with expanded sources of data from stakeholders where available.
Advantages	• Gets much information directly from those best able to provide this • Potentially fills in many of the NFDS gaps, especially with regard to movements of general freight by road • Fits in with NFDS structure if some data from agencies is not forthcoming • Based on a high level of voluntary participation, using data offered by key stakeholders • No mandatory actions
Disadvantages	• Reliant on industry stakeholders providing data in a timely and consistent fashion • Need to combine a range of data from different sources • Possible issues about grossing up road transport data and separating out flows already included in commodity data • Costs of setting up data requirements, following up with reluctant data providers and manipulating data from a number of different sources

Robustness of results	• Potentially good, given reasonable stakeholder response • Wide range of data sources provide opportunities for triangulation of data
Potential for extension beyond basic framework as defined in section 10.3	• Some potential if more detailed information can be provided by key stakeholders, but possibly limited because of the need to integrate different databases

Table 13.3 Option 3 - Option 1 + transport survey

Brief description	If option 2 does not, in practice, provide a reliable way of getting information on the total movement of goods by road, option 3 aims to overcome this with a survey of road goods traffic, to provide a more systematic approach to understanding the movement of goods by road. This could probably be extended to get more insight into the nature of the road transport industry, along the lines of the UK and Australian studies. An alternative to a survey of road goods vehicle operators would be a comprehensive series of roadside interviews. This would supplement but not replace the data gathering as in option 1.
Advantages	• Covers the difficult gap in the data gathering covering the movements of manufactured goods through the logistics chain by road, and because it would be a mandatory survey, it would give results under the control of the collection agency (subject to normal confidentiality constraints) • Would provide manageable data across the network • Would allow more investigation of particular characteristics of heavy commercial vehicle operation
Disadvantages	• Cost of running the survey • Would need powers to require respondents to answer, so would need a degree of political support • Respondents may be particularly reluctant to respond • Would probably need a dedicated team with an ongoing commitment of resources from whoever is funding the work for the survey and the subsequent management and analysis of the data from different sources
Robustness of results	• Potentially good. Survey would give additional analysis of details of road transport movements, although with some issues because of sample size • Findings would be supported by other data sources, as for option 2
Potential for extension beyond basic framework as defined in section 10.3	• With the survey, there could be the potential to extend the range of origins and destinations to a more detailed level • Would also provide linkage between particular commodity movements and mode of carriage/type of vehicle

Table 13.4 Option 4 - Option 1 + commodity flow survey

Brief description	If option 2 does not, in practice, provide a reliable way of getting information on the movement of all goods, option 4 aims to overcome this with a commodity survey to provide a more systematic approach to understanding the movement of goods by all modes. This survey would supplement (but not replace) the data gathering as in the NFDS.
Advantages	• Covers the difficult gap in the data gathering covering the movements of manufactured goods through the logistics chain • Because it would be a mandatory survey, it would give results under the control of the collection agency, subject to normal confidentiality constraints • Would provide manageable and consistent data for all modes to the extent covered by the survey • Would allow more investigation of intermodal operations • Could be combined with other surveys of firms' activities currently undertaken, to limit work required by the respondents
Disadvantages	• Cost of running the survey • Would need powers to require respondents to answer, so would have to get a degree of political support • Would probably need a dedicated team, with an ongoing commitment of resources from whoever is funding the work for the survey and the subsequent management and analysis of the data from different sources
Robustness of results	• Potentially good. Survey would give additional analysis of details of movements of commodities, although with some issues because of the sample size • Findings would be supported by other data sources, as for option 2
Potential for extension beyond basic framework as defined in section 10.3	• With the survey, there could be the potential to extend the range of origins and destinations, and also commodities and intermodal operations

Table 13.5 Option 5 - Option 2 + direct electronic data capture for road transport

Brief description	If option 2 does not, in practice, provide a reliable way of getting information on the movement of goods by road, and information provided by road transport operators is not forthcoming or is inadequate, option 5 aims to overcome this by tapping directly into the electronic data already generated by operators' management information systems, to fill gaps particularly for road haulage. This could be obtained directly or through a third party, to provide some screening of data to protect confidentiality.
Advantages	• Covers the difficult gap in the data gathering covering the movements of manufactured goods through the logistics chain • Information from the set-up of FIGS suggests that data may be able to provided quickly and possibly cheaply if an appropriate feed from road hauliers' information systems is obtained • More automated and hence more easily repeatable, ensuring that exactly the same data is collected • Larger samples could be collected for a similar investment • Could provide data on routes for road transport if this was in the road transport database accessed

Disadvantages	• Technical and institutional feasibility of GPS/ITS data collection is uncertain • It is uncertain how different sources of data would link together • There are issues of grossing up road data to cover freight users with no electronic information sources • Costs are uncertain. Possibly small for raw electronic data collection but may be more substantial for the processing of this and its incorporation with other data sources • Would need a dedicated team to manage and analyse continuous data inputs
Robustness of results	• Potentially good. Survey would give additional analysis of details of road transport movements, although the reliability of this would depend on the level of participation by road transport companies, which as discussed later in this report, could be very limited • Findings would be supported by other data sources, as for option 2
Potential for extension beyond basic framework as defined in section 10.3	• Would, in principle, provide potential opportunities for more detailed disaggregation of origins and destinations, and may provide data on routes

Table 13.6 Option 6 - Electronic data collection + other data collection as appropriate

Brief description	Use direct electronic data collection to generate as much data as possible and then fill gaps with other approaches, using a mixture of public information and approaches to key stakeholders. This represents a shift of emphasis compared with option 5, which uses electronic data collection to plug gaps.
Advantages	• Covers the difficult gap in gathering data on the movements of manufactured goods through the logistics chain • More automated and hence more easily repeatable, ensuring that exactly the same data is collected • Larger samples could be collected for a similar investment • Could provide data on routes for road transport • Origins and destinations would be defined for significantly smaller areas (although overall reporting would be constrained by limits on data collected from other sources and its statistical accuracy)
Disadvantages	• Technical and institutional feasibility very uncertain • It is uncertain how different sources of data would link together • Difficulty with understanding origins or destinations of freight, or 'trips'
Robustness of results	• Would depend on the level of participation by those supplying data which, as discussed below, is likely to be very limited
Potential for extension beyond basic framework as defined in section 10.3	• Possible potential to extend the range of origins and destinations, and also provide information on routing

All the options involve the need to bring data together from a number of sources in some form of hybrid approach, and with the exception of option 6, which is similar to the approach initially adopted by FIGS, involve making substantial use of data that is potentially in the public domain or can be obtained relatively easily.

13.2 Possible way forward: a hierarchical approach to information gathering

Although the outlined options have different focuses, they all involve the collection of data from a range of different sources. For this data collection process we have developed a hierarchical approach, involving the following five main steps:

Step 1: Gather publically available information from a range of data sources including SNZ, Ministries (especially the Ministries of Primary Industries and of Business, Innovation and Employment), reports of trade associations such as New Zealand Forest Owners Association, and major companies such as Solid Energy and Fonterra.

Step 2: Gather more detailed information that is available for sale, primarily from SNZ.

Step 3: Gather information that is available from sources that were cooperative in the NFDS. This includes a number of major production companies and also companies in the retail sector.

This could all be achieved fairly easily and the results would give a fair appreciation of the major freight flows. However, they would provide less information on the movements of semi-manufactured and manufactured products before they enter the retail chain or are delivered to final customers. Much of this freight travels by road and data collection for this is likely to prove more difficult.

Step 4: To attempt to fill this information gap, data should be sought from transport companies and a wider range of production companies.

Step 5: Where information gaps remain, develop simple synthetic models covering individual sectors.

To deal with the data collection identified under step 4, there are a number of possible approaches, including:

- a sample survey which, to be effective, has to be mandatory - this would be defined to the requirements of the agency collecting the data
- data typically provided as one-off tabulation from firms for a specified period, but not in as much detail as the sample survey or strictly following exact data guidelines – ideally it would be potentially repeatable to the same format
- tapping directly into firms' detailed information sources, providing a continuous source of information at a detailed level. These could relate to:
    - fleet management/GPS
    - consignment management.

These are discussed in the next chapters.

14 Sample surveys

Sample surveys of the types discussed in chapters 4 and 5 for the collection of data from road transport operators (UK and Australia), and in chapters 3 and 6 for the collection of data from producers and shippers (US and Sweden), would be one approach to filling any information gaps after the collection of data from readily available sources.

The approaches in these countries are mandatory, with firms required by law to complete and return the questionnaires. Typically, the forms are distributed by post and in the case of non-response a reminder is mailed out followed, if necessary, by a subsequent phone call. Despite this approach being mandatory and having a significant degree of follow-up, a response rate of about 90% is typically achieved for the road transport surveys. Even where responses are achieved, these may not provide useful information. In the UK survey of road transport operators, up to about 20% of the responses do not provide information on freight movements, either because the vehicle was not involved in these activities over the period stipulated, or because of irresolvable issues with the information provided.

A similar response rate of 90% was achieved in earlier US Commodity Flow Surveys, although it is noted that responses from the most recent survey are running at a lower rate, possibly reflecting the effects of the global financial crisis.

The authorities recognise that there is a burden in responding to requests for information, and the surveys are structured in a way that means that typically a lower burden falls on smaller companies, which form an important part of the road transport industry.

The advantages of a mandatory sample survey include the following:

- The data to be supplied can be specified to meet the requirements of the collecting agency. By having the responses in a consistent framework, the subsequent analysis should be facilitated.
- The data collected is under the framework established by the Statistics Act and, subject to limited confidentially constraints to protect the identity of the respondent, can generally be supplied for public use.
- The use of a detailed sampling frame makes the grossing up of the responses easier and facilitates the estimation of the statistical robustness of any estimates derived from these.
- There is a high degree of repeatability for that portion of the data collection task.

To undertake regular sample surveys in New Zealand would require the following:

- The development of an appropriate sampling base and the supply (to the firm or agency undertaking the surveys by the Transport Agency) of the details of the ownership of the vehicles selected. Confidentiality issues may limit the data that can be provided to agencies outside government.
- The availability of resources to undertake the surveys (including the initial mail-out and subsequent follow-up in order to achieve an acceptable response rate) and the initial coding of the results. Based on a heavy vehicle fleet size of about 110,000 and a survey size of about 10,000, the possible costs of the data collection and analysis might amount to $0.4-$0.6M per year for an annually repeated survey (covering only a part of the data collection task).

- An acknowledgement by firms that such an approach is acceptable – while large firms are more likely to be able to respond, there is likely to be considerable reluctance on the part of smaller operators to reply to the requests for information, particularly if repeated annually.

This likely reluctance to respond plus the probable unwillingness of the Government to place pressure on the industry to accept a mandatory approach (as evidenced in the Government response to the 2012 New Zealand Productivity Commission report) are likely to provide a significant obstacle to this approach, and at best it should only be pursued as a last resort. The option of mandatory surveys has not therefore been considered further at this stage.

15 Extending the voluntary responses from firms

15.1 Background

A formal sample survey may be difficult to achieve without being mandatory, and as we have discussed earlier, this is unlikely to be acceptable in the current environment in New Zealand. As an alternative, a less formal approach, involving a wider range of firms with a focus on those providing road transport services as well as those responsible for commodity production, could be attempted. Ideally, this would provide data in a common structure, preferably based on the structure defined in section 10.3 of this report. Experience from the NFDS has indicated that with a substantial level of support by the sponsoring agency, including a clear indication of the purpose of the data collection, it may be possible to get a fair response from larger firms. Without this support, this approach may not yield such good results.

To minimise the burden on the firm and to encourage a higher response rate, this type of survey should ideally be linked to the information that can be readily provided by the firms' own information systems. As has been discussed earlier, this would probably involve data being supplied in a range of different formats and with different definitions of the key variables, which will need to be put into a common basis. Possible approaches that could take advantage of improved electronic systems are discussed in chapters 16 and 17.

The data supplied in this way would typically cover a longer time period than might be achieved with a sample survey, and ideally would include totals over extended periods of time. This has the advantage of avoiding or reducing the issues of grossing up to annual totals. However, in aggregating the data over a longer time period, some of the detail on seasonal patterns is lost. For the purposes of the current study this would not be a serious issue, but over the longer term this may need to be reviewed.

In addition, whereas a sample survey can provide exact details about particular movements, bespoke data provided by firms will tend to include aggregations of these. It is therefore important that as far as possible, the process is set up so that these aggregations are in a form that matches the requirements of the data collection process as set out in section 10.3. However, this will not be possible in all cases and further manipulation by the firm or agency collecting the data may be required to put it in a form consistent with the other data collected.

15.2 Potential for response

In considering the extent to which it will be possible to generate the data required from this approach, the following three issues need to be considered:

- Can firms provide data?
- Will firms provide data?
- How could this be combined with data gathered in other ways?

The extent to which firms are able to provide the data required depends on the information that they need for their management information purposes. Transport firms know the exact addresses between which the

commodities are moved and the modes used, since this is an essential part of their operations. However, they may not necessarily know in detail exactly what commodities are being transported, especially if these are transported by container (or another mode), which does not require the transporter to directly handle the goods. Similarly, the producer or owner of the goods will know the nature of the goods being transported, but may not know the exact means of transport.

An issue for surveys of both producers and transport companies is to ensure that as far as possible, all commodity movements are covered. Commodity flow surveys have issues where large volumes of goods are produced by a large number of small producers, typically an issue with agricultural products and therefore likely to be important in New Zealand. Even in the US, the CFS only covers about 68% of all movements. Transport operators may have a greater knowledge of all transport movements, but as discussed above, may not know what they are carrying, especially for manufactured products. While they may be able to deduce this from the addresses they serve, this information may not be integral to their management information systems and so may not be easily incorporated in any response.

As well as the issue of firms having the information, there is also an issue regarding their willingness to provide it. This may reflect a lack of staff resources to prepare the information required, and also concerns about the confidentiality of the information provided.

The approach that firms might take was tested in a small survey of a range of road transport operators. This survey was undertaken without support from any sponsoring government ministry or agency. In general, the response was very limited, with most firms either failing to respond despite a reminder, or refusing to respond, generally citing lack of resources, especially the smaller more locally based firms, which may serve specialised markets. However, experience from NFDS suggests that the response rate would be improved with strong government support and a clear statement of the purpose to which the information would be put. More involvement with the appropriate trade associations, which are generally in support of the collection of improved freight data, would also assist

In practice, the data provided is likely to be restricted to a number of the larger firms and a limited selection of smaller companies. While this may provide reasonable coverage of longer routes, information at a local level may be more limited. This may therefore particularly affect shorter intra-regional movements, although alternative ways of obtaining this data, particularly as it relates to the movement of basic commodities, such as livestock and aggregates, may be available. While the data from larger firms can be repeated regularly, as is done for FIGS, the data is, by definition, only part of the overall transport mix, and without a more comprehensive study from time to time, it is difficult to place this into the context of the overall position.

16 Information from GPS or fleet-tracking data

16.1 Introduction

Fleet-tracking data (using GPS and other systems) is used primarily to provide the location of vehicles. New Zealand is a global leader in fleet tracking and currently in New Zealand over 25 commercial fleet-tracking providers are tracking more than 100,000 vehicles. Each provider has developed a slightly different system. A few major companies operate their own systems, but in general, the information is processed by third-party organisations. Because each system has been developed for different business reasons, all are bespoke, developed in isolation from other systems and requiring technical standards (interfaces) to operate effectively with other systems. There has been little guidance from external parties or Government on the development of common standards.

By nature, fleet-tracking systems track vehicles rather than commodities. Defining the origin and destination of vehicle 'trips' relies on algorithms that may result in some inaccuracy, albeit on a small scale.

16.2 GPS in New Zealand

Since 2010 it has been possible to pay RUCs electronically in New Zealand, using compliance-grade fleet-tracking systems. Such systems are operated by Transport Agency-approved electronic system providers. To date, two companies (EROAD and International Telematics) have been approved by the Transport Agency to operate electronic RUC systems.

RUC data may be lawfully obtained by the Transport Agency for statistical purposes under schedule 1 of the Road User Charges Act 2012. This states:

> *3 Disclosure of RUC information to RUC collector*
>
> *(1) An electronic system provider must, on request and on the receipt of payment of a reasonable fee by the RUC collector, supply to the RUC collector any specified traffic or transport information required by the RUC collector for transport network planning purposes.*
>
> *(2) The information supplied under subclause (1) must—*
>
> *(a) be in a form approved by the RUC collector; and*
>
> *(b) be supplied only in aggregate form and in a way that does not identify any specific transport operator or electronic system provider.*

Beca have constructed a database with a Geographic Information System (GIS) presentation layer that uses data obtained in this way. The database demonstrates vehicle movements from information supplied to the RUC collector (the Transport Agency) from one of the two electronic service providers. There are a number of limitations to this system (and almost all other fleet-tracking systems), since these by their nature track vehicles rather than commodities.

Limitations of the ability of GPS/fleet-tracking systems to generate information on freight flows currently include the following:

- There are difficulties in accurately identifying vehicle origins or destinations, for instance when vehicles stop for fuel, at traffic lights, or for rest breaks. Detailed examination of the data and development of appropriate algorithms for analysing the data may help overcome these issues. This may require the data to be provided in a disaggregated form, which raises issues about commercial confidentiality.
- Commodity type cannot be directly identified, since this is not part of the GPS record. To some extent it may be possible to make estimates of these by looking at the origins and destinations of particular movements where these are available. Again, the use of disaggregated data raises issues of confidentiality.
- Consignment weights or volumes cannot be determined.
- Information about actual fleet composition (eg light vehicles as distinct from heavy vehicles, and double-counting of powered vehicles towing trailers) is not collected. Because of the uncertainty about the exact coverage of the data provided, this raises issues regarding the grossing up of freight data, although in terms of the movements of vehicles, comparison against observed counts can be used to expand the data collected.
- The information collected by Beca also has some additional limitations because of the source and nature of the data collected.
- Truck–trailer combinations are treated as two separate vehicles.
- The database also contains light vehicles, which it may not be possible to distinguish separately or remove from the database.
- It is a non-random sample of vehicles, due to specific fleets operating a particular tracking system (while movements by other vehicles are not recorded for comparison). The nature of the electronic Road User Charging (eRUC) system suggests that the take-up of this approach would be biased towards those activities most likely to generate RUC rebates for operating off the public road system; eg for logging trucks or vehicles operating within transport terminals such as ports. Therefore the extent to which the take-up of the system biases any subsequent analysis is uncertain, even for the consideration of heavy vehicle flows.
- The sample has a limited statistical spread. The number of vehicles that traverse specific roads at a given time may not provide an accurate representation of actual trends.

It is understood that the database is expanding substantially and some of the concerns identified may therefore be reduced. The test of the data would be to compare this against observed freight movement patterns, and an opportunity for this may emerge as part of the work being undertaken by Auckland Transport in their investigation of the Auckland MMEWS[27] corridor linking SH1 and SH20 between Penrose and Onehunga. This involves a range of surveys, including the development of matrices using Automatic Number Plate Recognition (ANPR) surveys, which may provide a possible basis for comparison with the Beca data.

27 Multimodal East-West Solutions Study being undertaken by Auckland Transport.

At the beginning of this research project, the use of GPS or fleet-tracking data was seen as a possible approach to the generation of data on the freight task. It is being increasingly used for the understanding of *freight vehicle movements*, with New Zealand examples, including the work undertaken by TDG (Traffic Design Group Ltd) on the Christchurch model looking at local movements and the Beca analysis providing a possible source of data on local and longer-distance flows. A number of studies in the US also provide examples of the application of this information (McCormack 2010). However, for the reasons described above, no significant progress has been made in using this approach to gain information on the *freight commodity flows* that form the focus of this report. There are difficulties in linking commodity and weight/volume data to the GPS records, and indeed achieving this may reduce the availability of the GPS data itself because of confidentiality issues.

While this approach is, in principle, highly repeatable at whatever interval is desired, the difficulties of understanding what is actually in the vehicles remain, and in our view outweigh any benefits of repeatability.

While by itself GPS or fleet-tracking data does not at present provide a useful source of data on freight commodity movements (the focus of this report), it can form an input to firms' management information systems, which would in turn form the basis of any industry provision of the detailed freight information. However, this is an area where technology and practice is evolving rapidly - while there are no signs from other countries that data derived from GPS or fleet management systems has been used to provide detailed commodity information, this position could change and should be kept under review.

17 Information from management information systems - transport firms

17.1 Introduction

All transport firms keep some form of information on the consignments they carry, in either a paper-based or electronic system, with varying degrees of sophistication and complexity. At a minimum this would include:

- the detailed origin and destination, so that the goods could be picked up and delivered
- the time, or at least proof, of delivery
- some indication of the size of the consignment, although the way in which this is recorded could vary and could, for example, just be in the form of 'truckload' if the customer is prepared to hire the whole vehicle, or 'full container' if the goods are transported in this unitised mode
- the transport mode used if the operator uses more than one mode.

Details of the weight or volume of the consignment would be required if the customer was not hiring the whole vehicle or if there was a choice of vehicle. Information on the commodity to be transported may be limited unless the goods are hazardous, perishable or require special handing, although some form of commodity definition may be entered as routine. However, the form in which this information is recorded tends to vary from company to company, reflecting their needs.

This forms the minimum information collected by all firms. Although in principle it is possible, a paper-based system would not form an easy basis for the extraction of data in the desired form as set out in section 10.3.

17.2 Collection of freight data from transport companies

Although paper-based systems exist, the majority of freight is transported by firms that employ some form of electronic management information system. In practice, the form of this could vary significantly from firm to firm including, as indicated above, different commodity definitions and possibly information above the minimum specified above. The most accurate freight information is already collected and stored, electronically and very accurately, within the information systems of transport firms and logistics providers.

Because the information about each consignment is commercially sensitive, firms are typically unwilling to provide direct access to this information, so some form of aggregation would be required before this could be released into the public domain. This could be undertaken by the firms themselves, or a trusted third party could standardise and aggregate the data - or a combination of the two may be required as, for example, was the case for elements of the NFDS. While this approach is accepted for the analysis of GPS data, which in most cases has to go outside the firm for processing (as is the case for the eRUC material), there is likely to be more resistance regarding the more confidential management information, which is typically processed within the firm itself.

Whichever of these approaches is undertaken, this would be facilitated by the development of common definitions of origins and destinations and of commodities, and the guidelines set out in section 10.3 could provide a basis for this. In principle, a technical standard (data format) could be devised supporting an API (application programmatic interface). For example, this may be set up in a format similar to that demonstrated with the following indicative fields (further metadata fields would be required to describe the data):

- <consignment unique id>
- <origin details in a common format>
- <origin date>
- <origin time>
- <transport mode>
- <destination details in a common format>
- <destination date>
- <destination time>
- <consignment commodity in a common format>
- <volume m^3>
- <weight kgs>.

Building a national information system that contains the majority of road freight movements and uses a defined data format and automated data collection would provide the greatest degree of accuracy, repeatability and survey reliability. Consequently, decisions made based on using such a system would be very well informed. There would therefore be advantages in encouraging operators to develop systems that use common data definitions.

17.3 Overall assessment

While such an approach could, in principle, provide an effective component of any freight data collection system, in practice, based on our experience in New Zealand and evidence from overseas, this is currently not likely to be feasible. Unlike GPS data, which is typically processed by third-party operators, management information systems are typically processed and managed in-house and contain confidential and commercially sensitive information, particularly with regard to customers and pricing. Developing a system that permits direct access to this information would require setting up a process that retains the confidentiality of commercially sensitivity data. At present there is little evidence of this happening. Operators may be prepared to provide information based on their management information systems on a periodic basis. This would be facilitated by the development of a common approach to the definition of origins and destinations and to commodities. However, they are unlikely to be prepared to provide this information automatically on a nation-wide basis.

18 Alternative approaches – freight modelling

18.1 Introduction

As an alternative or supplement to collecting detailed data on freight movements, freight models can be developed that aim to estimate freight flows indirectly rather than relying on direct observations. If these could make use of data collected for other purposes, they would potentially provide a relatively inexpensive way of estimating freight movements, and if the data on which they were based was updated regularly, the approach could easily be repeated at regular intervals. If such an approach could provide reliable results it would therefore be very attractive.

18.2 Approaches to freight modelling

Due to the complex nature of freight flows, different modelling approaches can be adopted. There are two typical types of model: commodity-based ('freight') or vehicle-based ('commercial vehicles'). For this study the commodity-based models are of more interest, but approaches to vehicle-based modelling are also considered because of the insights these might provide to the overall collection process.

18.2.1 Commodity-based modelling

Commodity-based models are designed to capture the relationship between the economy and freight flows and hence to represent the fundamental economic mechanisms that drive freight movements. These use general information about the values of production and consumption. Freight movements are then estimated, possibly from national input-output or supply and use tables, assumptions about the way in which the traffic is distributed (normally through a simple gravity model or similar process), and typical freight values per tonne in order to translate the values into volumes. The inbound and outbound flows are disaggregated to a zonal level, based on economic data that reflects intensity of production and consumption (eg zonal employment levels). It does not use detailed data on the observed patterns of movement for individual commodities to any great extent, but does need to be calibrated at some stage against some form of real-world data. Flows are sometimes converted to trips, once they are allocated to origins and destinations based on commodity-specific payload data. At the final stage of the modelling, the New Zealand Freight Flows Model developed for the Transport Agency, essentially to cover freight movements in the Upper North Island, calibrated its freight flow forecasts against selected observed movements of heavy vehicles.

A synthetic model can provide comprehensive coverage where detailed freight flows are not well documented, and typically uses a limited range of sources. However, because of the limited sources of data and the requirement to impose standard and indirect relationships on what is a complex position, this approach may not replicate individual commodity movements reliably, and may be a problem both for high-value commodities (which have complex distribution chains) and low-value products (which may have very simple movement patterns). In particular, where low-value products comprise a significant part of the freight task, as is the case in New Zealand, this causes particular issues, since these may have different patterns of movements to more complex products. A common forecasting approach may not be able to reflect these differences. There are particular examples of this in the movements of basic commodities, which may move in ways that typical freight models would have difficulty in predicting.

While commodity-based models are used overseas (eg in the UK), these are supported by substantial volumes of observed freight data to calibrate the flows, and are used more to look at forecasts over time, or in response to changes in policy, rather than to replicate existing patterns of flow. In New Zealand, where much of the freight is concentrated in a few basic commodities and where flows may be subject to decisions by a few players or by overseas conditions, predicting the patterns of flows is much more difficult and modelled estimates of flows produced to date have not matched observed movements particularly well. In addition, while the approach could be repeatable, the basic relationships in the model can quickly become out of date without regular recalibration.

Synthetic modelling for overall freight flows may not provide an appropriate approach at a global level, but where direct information on flows is available, there may be a role for more focused models for commodities where there are no alternative sources of data available. This may be useful for types of manufactured products where gaining an assessment even of the total volumes to be transported may be difficult, although the availability of pallet-based data may reduce the need for this.

Overall, while the approach is probably not appropriate for looking at the position for all commodities, it may have a role for specific commodities where alternative data is very limited or non-existent.

18.3 Vehicle-based modelling

In contrast, vehicle-based models focus on modelling vehicle trips and have units of vehicles. They are typically applied at the urban scale, with the model form generally following the structure of person-based travel models. These models do not have a link to the economy and cannot reflect the behavioural characteristics of freight flows. However, they do require significantly less data to develop and hence are often developed for transportation-planning purposes.

In New Zealand, the transport models of the major cities (Auckland, Waikato, Wellington and Christchurch) have embedded vehicle-based models to estimate trips made by medium and heavy vehicles. As indicated earlier, this is an area where GPS data can play a valuable role. While currently this does not include commodity data and so is not relevant to the current work, this may be an area where technical developments may change the position, especially for movements at a local level.

19 Broad data collection costs

19.1 Costs of existing freight data collection processes

Based on a selection of international and New Zealand experience, the costs of existing forms of freight data collection and analysis are set out in table 19.1.

Table 19.1 Broad data collection costs (NZ$)

Data collection approach	Cost	Country
Continuing Survey of Road Goods Vehicles	$0.4-$0.6M pa	UK
Commodity Flow Survey	$1.5M	Sweden
Commodity Flow Survey	$25-30M	US
Estimated analysis and expansion of Commodity Flow Survey	$30-50M	US
Total for freight analysis in the US per cycle	*$55-75M*	*US*
2008 National Freight Demand Study	$0.4M	NZ

19.2 Costs of proposed approaches

Approximate costs have been estimated for the different approaches set out in sections 12 and 13, and these are set out below in table 19.2. These costs include both the data collection from different sources and its processing and analysis to provide a comprehensive assessment of the freight flows on a regional basis. In all cases it would be necessary to collect data from a wide range of sources, and the formal surveys in options 3-6 would only form a part of the overall task.

Table 19.2 Broad data collection costs for proposed alternative approaches

Option	Description	Estimated cost
Option 1	Simple NFDS update	$0.1M
Option 2	Option 1 with extended stakeholder data	$0.4-0.5M
Option 3	Option 1 + formal transport survey	$0.6-0.7M
Option 4	Option 1 + formal commodity flow survey	$1.5-2.0M
Option 5	Option 2 + electronic data capture for road transport	$0.4-0.5M + set-up costs
Option 6	Electronic data collection + other data collection as appropriate	$0.4-0.5M + set-up costs

20 Identification of multimodal traffic

One of the issues identified in the scope of work for this project was the identification of freight that moves by more than one mode. In practice, this would represent goods that moved by road and rail or road and coastal shipping, although in the future this could include the movement of cement from a relocated Holcim plant, which would involve movement by rail and coastal shipping.

In essence, there are probably two main ways of estimating this traffic, either by identifying it exactly from surveys of the shippers of goods or by inferring it from the data collected on movements by rail and coastal shipping.

Taking movements by rail as an example, these movements comprise a mixture of single-mode movements (where goods are directly loaded to rail at, for example, a private siding and then transported directly to a customer or port) and multimodal movements (where rail is used as part of a more complex supply chain). Examples of single-mode movements would include the transport of coal, or the transport of steel from the NZ Steel plant at Glenbrook direct to the port of Tauranga, where no intermediate mode is involved. Multimodal movements would include, for example, the movements of manufactured goods between distribution centres in Auckland and Christchurch, where the goods could be moved by road at both ends of the journey, and by rail for the intermediate section.

In general, it is reasonably easy to identify multimodal movements from the examination of the commodities carried by rail and coastal shipping and their origin/destination patterns, and it is proposed that this approach should be adopted.

21 Assessment by commodity

For each of the commodities that we propose should be considered in any freight data collection exercise, a summary of the experience gained from the 2008 NFDS, and the ways in which data might be collected in the future, has been prepared. This is set out in tables 22.1-22.6.

For convenience and ease of reading we have divided the identified commodities into a number of groups, but the table structure is similar in all cases. Where appropriate we have indicated the appropriate numerical or lettered Harmonised Commodity Codes, but in many instances the commodities we propose should be included in the survey do not fit exactly with these headings and so do not have numbers or letters attached.

Table 21.1 Assessment of data collection issues by commodity - animals, meat, and milk and dairy products

	01. Live animals	02. Meat & edible offal	03. Fish & sea food	Liquid milk	Non-perishable and perishable dairy products
Considered in NFDS	Yes, but limited	Yes	No	Yes	Yes
Volumes from NFDS (M tonnes in 2006-07)	3.6	0.9		17.1	3.8
Accuracy and coverage of NFDS	Limited & only covers livestock associated with movements to abattoirs for export meat	Limited to export meat but probably covers large part of market. Movement patterns by road estimated but available for rail	Not covered	Good producer data. Flow patterns estimated but are probably reasonable	Good data from producers on dairy products as a whole
Sources of published data	NAIT, but at best, cattle & deer only for immediate future. Possible auction/saleyard data on volumes handled	Limited material from SNZ but aggregated by groups of regions	Some from MPI	LIC[a]	
Importance of international trade	Low	High	High	Low	High
Existing data from producers	May be derivable from auction data but would only cover totals, not movement patterns	Potentially from major firms, but generally very reluctant to provide information		Data from Fonterra, particularly for movements between plants. Also data from Westland Milk	Data from producers, although sometimes slow to provide information
Potential data sources for ODFVIS: Production	NAIT + surveys/analysis of auction data to extend from cattle to all livestock	Surveys of producers, but uncertain potential for obtaining data. Potential for use of NAIT data		LICS + producers	Data from producers
Potential data sources for ODFVIS: Transport	NAIT + surveys of specialised transport firms	Producers or transport companies. Rail data available		Producers possibly + rail	Data from producers

	01. Live animals	02. Meat & edible offal	03. Fish & sea food	Liquid milk	Non-perishable and perishable dairy products
Priority for assessment in ODFVIS	Moderate	Moderate	Low	High	High
Key stakeholder: Production		AFFCO/Silver Fern	Sealord	Fonterra, Westland Milk, smaller dairy companies	Fonterra, Westland Milk, smaller dairy companies
Key stakeholder: Transport				Fonterra, Westland Milk, smaller dairy companies	Fonterra/Dairy Transport Logistics, Westland Milk, smaller dairy companies
Priority for detailed data collection	If NAIT data available, need sample survey to extend to other livestock types.			High, since volumes large	High, but can probably be obtained relatively easily
Suggested focus of data collection	NAIT + selected transport companies & saleyards	Producers/transport companies	Producers/SNZ	Published data/ producers	Producers
Potential for synthetic modelling					
Repeatability	Good if NAIT available	Limited (good if NAIT can be used)	Good	Very good	Good

a) Livestock Improvement Corporation

Table 21.2 Assessment of data collection issues by commodity - edible fruit and vegetables, cereals and other agricultural and food products

	07. Edible vegetables	08. Edible fruit & nuts	10. Cereals	A. Other ag. products	22. Beverages, spirits & vinegar	B. Other food products
Considered in NFDS	Yes	Yes	Yes	Included in 'Other' & not estimated directly	Included in 'Other' & not estimated directly	Included in 'Other' & not estimated directly
Volumes from NFDS (M tonnes in 2006-07)	4.2	4.2	4.2	N/A	N/A	N/A
Accuracy coverage of NFDS	Limited, with high levels of estimation			Not identified separately but considered when enter retail chain		
Sources of published data	Production data limited & typically slow to be produced. Most recent data 2007. Customs data available		Production data limited & typically slow to be produced. Customs data available	Limited		
Importance of international trade	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

	07. Edible vegetables	08. Edible fruit & nuts	10. Cereals	A. Other ag. products	22. Beverages, spirits & vinegar	B. Other food products
Existing data from producers	May be difficult to obtain in detail				None	
Potential data sources for ODFVIS: Production	Possibly data from major packing companies/marketing boards + SNZ, but likely to be patchy		SNZ	To be investigated	Producers	
Potential data sources for ODFVIS: Pallet database	Possible	Possible		Possible	Possible	Possible
Potential data sources for ODFVIS: Transport	Data from transport firms/KiwiRail	Data from transport firms/KiwiRail	Data from transport firms/KiwiRail			Data from transport firms/KiwiRail
Priority for assessment in ODFVIS	High	High	High	Low	Moderate	Low
Key stakeholder: Production	Marketing boards/ agencies	Marketing boards/ agencies	Millers, stock feed producers	Large number of firms/producers	Coca-Cola/ Pernod Ricard/ Breweries	
Key stakeholder: Transport	Road transport companies, especially Turners & Growers	Road transport companies, especially Turners & Growers	Road transport companies	Transport companies, especially Turners & Growers		
Priority for detailed data collection	Moderate	Moderate	Moderate		Moderate	
Suggested focus of data collection	Marketing boards/transport companies	Marketing boards/transport companies	Marketing board/SNZ + KiwiRail		Producers	Producers/ transport companies
Potential for synthetic modelling						Possible
Repeatability	Moderate-good	Moderate-good	Moderate	Moderate	Moderate	Moderate

Table 21.3 Assessment of data collection issues by commodity – minerals and chemicals

	Aggregates	Limestone	Cement	Coal	Petroleum	C. Other mineral products	31. Fertiliser	D. Other chemical & allied products
Considered in NFDS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included in 'Other' and not estimated directly
Volumes from NFDS (M tonnes in 2006-07)	40.2	5.1	2.1	6.4	9	2	2.8	
Accuracy coverage of NFDS	Good producer data from Crown Minerals	Good	Good	Good	Good	Good	Good	
Sources of published data	Crown Minerals	Crown Minerals		Crown Minerals + Solid Energy & Customs data	In principle LA Petroleum Tax but difficult to identify on a consistent basis		SNZ for use by region	Little data on volumes
Importance of international trade	None	Limited	Limited	High	Limited		Moderate	Moderate
Existing data from producers		Data from some lime producers	Data from manufacturers	Use of published data	Data from refinery + import data	Data from major producers	Data from Ballance & Ravensdown	Data from Dow Chemicals
Potential data sources for ODFVIS: Production	Crown Minerals + possibly producers	Producers	Producers	Producers/ importers	Data from refinery + import data + distributors		Producers	Producers
Potential data sources for ODFVIS: Pallet database							Possible	Possible
Potential data sources for ODFVIS: Transport					Shipping Company + distributors			Operations of general transport companies
Priority for assessment in ODFVIS	High	Moderate-high	Moderate-high	High	High	Low	Moderate	Low

	Aggregates	Limestone	Cement	Coal	Petroleum	C. Other mineral products	31. Fertiliser	D. Other chemical & allied products
Key stakeholder: Production		Holcim/Omya /Ravensdown		Solid Energy + other producers	NZ Refining + petroleum companies	Imerys & others	Ballance/ Ravensdown	
Key stakeholders: Transport	Largely undertaken by producers, although may be changing	KiwiRail & road transport	Producers' own sea & road transport	KiwiRail + producers	Shipping + producers	KiwiRail & road transport		
Priority for detailed data collection	High	Moderate, since some data available from published sources	High	High	Moderate. Can make reasonable assessments on basis of data likely to be available	Moderate	High	
Suggested focus of data collection	Published data	Published data/survey of major operators	Producers	Producers/ published stats/KiwiRail	Shipping + imports with simple model for onward distribution if not available from companies		Survey of producers Ballance/ Ravensdown + SNZ data	Key producers + transport companies
Potential for synthetic modelling								Possible
Repeatability	Very good	Good	Good	Very good	Very good	Moderate-good	Good	Moderate-good

Table 21.4 Assessment of data collection issues by commodity – logs and timber products

	Whole logs	Wood chips	Sawn & shaped timber	Timber board & plywood	F. Other timber products	47. Pulp of wood	G. Paper & printed goods
Considered in NFDS	Yes	Yes	Yes	Yes	Not explicitly	Yes	Yes
Volumes from NFDS (M tonnes in 2006-07)	20		4.3	1.8		1.8	
Accuracy coverage of NFDS	Good producer data. Flow patterns in general estimated, but are probably reasonable	Good producer data. Flow patterns in general estimated, but are probably reasonable	Good producer data. Flow patterns in general estimated, but are probably reasonable	Good producer data. Flow patterns in general estimated, but are probably reasonable		Good, with some estimation	Good producer data. Flow patterns in general estimated, but are probably reasonable
Sources of published data	MPI for regional data		MPI for regional data			MPI for regional data	
Importance of international trade	High	High	Moderate-high	Moderate-high	Moderate-high	Moderate-high	Moderate-high
Existing data from producers	Number of producers. Possible data from NZFOA	Number of producers. Possible data from NZFOA	Carter Holt Harvey (CHH), although confidentiality constraints	CHH, Laminex			
Potential data sources for ODFVIS: Producers	SNZ + producers NZFOA	SNZ + producers NZFOA	CHH + major sawmills (Red Stag, etc)	Producers		Producers	Producers
Priority for assessment in ODFVIS	High	High	High	Moderate-high	Moderate-high	High	Moderate-high
Key stakeholders							
Priority for detailed data collection	Low because of published data	Low because of published data	High	High		Moderate	Moderate
Suggested focus of data collection	Producers/ SNZ	Producers/ SNZ	Producers/ SNZ	Producers/ SNZ	Producers/ SNZ	Producers/ SNZ	Producers/ SNZ
Potential for synthetic modelling							
Repeatability	Very good	Good	Moderate-good	Moderate-good	Moderate	Moderate-good	Moderate-good

Table 21.5 Assessment of data collection issues by commodity – wool and manufactured products

	51. Wool	E. Other plastics, leather & textiles	76. Aluminium & articles thereof	I. Iron & steel and articles thereof	H. Other base metals & articles	K. Vehicles	J. Other manufactured goods
Considered in NFDS	Included in 'Other' and not estimated directly	Partly as part of retail sales	Yes	Yes	Included in 'Other' and not estimated directly	No	Partly as part of retail sales
Volumes from NFDS (M tonnes in 2006-07)			1.9	1.9			
Accuracy coverage of NFDS			Fair with some estimation	Fair with some estimation			
Sources of published data	MPI/various						
Importance of international trade	High	Moderate-high	Moderate-high	Moderate-high	Moderate-high	High	Moderate-high
Existing data from producers		None	None	NZ Steel/ Fletchers	None		None
Potential data sources for ODFVIS: Producers	Trade data	Trade data	Producers + trade stats	Producers + trade stats		Trade data + Importers	
Potential data sources for ODFVIS: Pallet database		Possible			Possible		Possible
Potential data sources for ODFVIS: Transport	General transport companies/ KiwiRail	General transport companies/ KiwiRail	General transport companies/ KiwiRail	General transport companies/ KiwiRail			General transport companies/ KiwiRail
Priority for assessment in ODFVIS	Low	Moderate	Moderate	Moderate	Low	Moderate	Moderate
Key stakeholders: Production		Various		Fletchers, NZ Steel			
Key stakeholders: Transport		Various		KiwiRail			
Priority for detailed data collection	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Suggested focus of data collection	Producers/SNZ	Transport companies	Producers	Producers	Transport companies	Import statistics, Transport Agency statistics & importers	Transport companies
Potential for synthetic modelling		Possible			Possible		Possible
Repeatability	Moderate	Moderate	Moderate	Moderate-good	Moderate	Good	Moderate

Table 21.6 Assessment of data collection issues by commodity – waste, retail and concrete

	L. Waste	Retail super-markets	Retail – other	Concrete
Considered in NFDS	Included in 'Other' & not estimated directly	Yes	Yes	Yes
Volumes from NFDS (M tonnes in 2006-07)		7.4	6.6	8.9
Accuracy coverage of NFDS		Good	Moderate with substantial estimation	Good
Sources of published data	No comprehensive source	Retail sales by value, by region	Retail sales, by value, by region	Sales, by region, SNZ
Importance of international trade	Limited	None directly	None directly	None
Existing data from producers	Some but very dispersed	None	None	Not used
Potential data sources for ODFVIS: Producers	LA/ Envirowaste, etc	Progressive/Foodstuffs	Warehouse/ Mitre10/ Farmers	SNZ
Potential data sources for ODFVIS:Pallet database				
Potential data sources for ODFVIS: Transport		Linfox/Route and Retail/ AF Flowers	General transport companies	
Priority for assessment in ODFVIS		High	High	High
Key stakeholders: Production		Progressive/Foodstuffs	Warehouse/Mitre10/ Farmers	
Key stakeholders: Transport		Linfox/Route and Retail/ AF Flowers	General transport companies	
Priority for detailed data collection		High	High	High
Suggested focus of data collection	Main operators	Supermarkets	Transport companies	SNZ
Potential for synthetic modelling				
Repeatability	Moderate	Good	Moderate-good	Very good

These tables provide a possible framework for data collection covering the range of commodities that we have identified, and give some indication of the importance of these and the priorities that might be attached to understanding the patterns of flow.

The tables include methodological details in terms of sources of published and unpublished data, and a suggested focus of data collection, to provide a framework for the data collection. They also include an assessment of its repeatability, in terms of a researcher being able to access the same or similar data in different years. That is assessed to be 'good' or 'very good' in many cases, meaning we believe a researcher should have no significant issues in accessing the data and repeating earlier work. Those marked 'moderate' would need some further work to establish and assess, on the part of a future researcher. There is one item (meat) marked 'limited'. This has been and will be difficult because of confidentiality concerns.

While building on this framework, the exact detail of the methodology to be adopted would be developed in the course of the updating of NFDS, particularly taking into account any new sources of information and

the clarification of the approach for commodities where the existing approaches still need further work. While we have suggested ways forward for these, the approaches need to be tested in a real-world situation. Detailed recording of the methodology would also enable it to be readily repeated.

The transport industry is dynamic, and detailed information such as flows from region to region are especially subject to change, as they directly reflect changes to the productive activity in regions, changes in transport mode and transport patterns, and port and shipping changes. Any mechanistic approach to updating freight demand information will face the problem of the relationships between regions being quickly out of date. Automatic data feeds will also need reassessment and revision for the same reason.

Moreover, even if data on particular parts of the freight sector is supplied automatically, it will still need experienced judgement applied to it before it is useful as part of the wider picture, in situations such as having to choose between competing sources of similar data, or to combine data coherently from different sources. This process has been called ‘data fusion’ or ‘welding’, and as it relies on wide knowledge of the transport industry, judgement and some estimation, it needs to be done by a person with suitable experience. There are a number of such people in New Zealand and so this should not be an issue. As with any process that relies on judgements, different people may arrive at different results, but given the available base of hard data, this variability should only be at the margin. A process with more automatic repetition, while ostensibly less variable, is likely to achieve this at the expense of oversimplification of the complexity of the transport demand patterns.

The dynamic nature of the industry probably means that the study should be repeated about every five years. This would also be true if a modelling approach was possible, as the model would need regular recalibration. In the interim years, updating the major commodity flows would be a simple and relatively cheap task, especially if it was based on readily accessible information. FIGS could act as a suitable repository for a range of data collected in between full studies, although the application of this data to update the full five-yearly analyses could be undertaken by another agency or firm.

22 Conclusions and recommendations

A number of different approaches to the collection of data on the movement of freight have been adopted by overseas countries. These typically involve collecting detailed information either from the producers and shippers of goods through a commodity flow survey, or from transport operators through some form of vehicle-based sample survey. Although the data collection exercises focus on one or other of these surveys, these tend to be supported by the collection of data from a wide range of other sources and further detailed analysis, before being translated into robust and comprehensive freight patterns.

In developing our recommendations for the collection of data on the freight sector and the update of the NFDS, we propose the application of a hybrid approach that would similarly combine data from a wide range of sources. This would involve the following:

- *Collecting information from both producers and transporters of commodities*: Given the nature of the freight task in New Zealand, with a high proportion of flows representing the movements of a limited number of basic commodities, this would have a strong focus towards the producers and shippers of commodities. Information would be sought from a wide range of stakeholders to help validate the responses obtained.
- *Collecting information from a variety of different sources, reflecting those who are most easily available to supply the data:* This would involve a combination of:
  - published sources
  - sources that are not published but are available for purchase
  - information on commodity movements from key stakeholders in the individual sectors
  - general information on freight movements from those undertaking its transport.

Given the current environment in New Zealand, the approach we have proposed is based on data collection from public sources, or on voluntary participation without mandatory surveys. We have developed a framework of data requests from firms that would aim to utilise information that could be easily extracted from their management information systems. This would reduce the required effort for those collecting the data to process the information and place it in a format where it could be combined with the other sources of information collected through the project. It should be emphasised that all the evidence suggests that if this approach is to be successful, it would need strong Government support to encourage firms to respond and to provide clear indications of the planning framework within which the data collected could be used.

As far as possible, the firms participating would be encouraged to enter into long-term agreements with the sponsoring agency to provide the data requested at periodic intervals. This would facilitate the regular updating of the NFDS.

It is envisaged that the hierarchy of data collection would include the following steps:

1 Collect data that is freely available from public sources. This would include material from SNZ as well as that produced by a range of industry groups and major manufacturers where these dominate the flows of particular commodities. Solid Energy would be a particular example of such a firm.

2 Purchase data that is available from public sources such as SNZ and possibly the Ministry of Primary Industries and other similar bodies. This would often provide data at a greater level of product or geographical disaggregation than is available from generally published data.

3 Acquire unpublished data from key commodity producers, transport operators, and other parties who have demonstrated their willingness to participate in exercises such as these. This would be accomplished primarily by interviews with appropriate members of these firms, attempting to collect data within a common framework to facilitate its subsequent processing.

The upshot of these three steps would be a good appreciation of the movements of a wide range of basic commodities and some manufactured goods within New Zealand, and potentially a more detailed understanding of movements by rail and by coastal shipping. The following steps would aim to provide greater detail for additional commodities not covered (or not covered in detail) above, particularly those with more complex supply chains:

4 Aim to acquire data from firms that have not so far demonstrated their willingness to participate. This would typically involve those responsible for production and distribution of manufactured goods and for their transport. It is for this group that Government support would be most important.

5 Where the methods outlined above do not provide a satisfactory level of data to allow the patterns of flows to be estimated, explore alternative approaches such as synthetic modelling based on high-level economic inputs for the sectors concerned.

The hybrid approach seeks to obtain information by those most willing and able to provide this, and aims to minimise the degree of effort required from the respondent, while ensuring that the information provided is at an appropriate level of detail for inclusion in the overall freight database. However, although efforts would be made to standardise the data to be received, the voluntary nature of the exercise means that it would not be possible to get all the information in a common format. It would require a potentially substantial effort to assemble these in a common format to allow a comprehensive freight position to be identified. In this case, while the cost of data collection would be fairly low, there would be a relatively high cost of processing it into a consistent whole. However, experience overseas indicates that the alternative of a structured mandatory survey also involves substantial costs in establishing and managing the responses. This would not necessarily represent a cheaper option and would be subject to considerable resistance from those asked to supply the data.

We also investigated the potential for direct electronic data collection from potential respondents, since in principle, this could ease the data collection task. There are potentially two sources of information – the GPS systems used for vehicle management and the firms' own management information systems.

The GPS systems typically involve third-party operators to process and often manage the information itself, and this provides possibilities for aggregation, which would prevent the activities of particular firms being identified. In principle, this would provide a possible source of data, as is currently the case for the eRUC data that is supplied periodically to the Transport Agency and their consultants for subsequent analysis of transport patterns. However, this is limited by being vehicle-based data rather than freight-based data and it is not able to provide information on the commodities carried, or their volumes. In addition, it only covers a part of the heavy vehicle market, which is currently believed to be about 3% (although this share is increasing). As a consequence there are issues that are yet to be resolved with grossing this up to industry totals, even just for vehicle flows. Obtaining data from other fleet management companies could help to address this, although this would require establishing agreements to maintain confidentiality.

It should, however, be noted that while these fundamental problems currently exist, it is an area where the position is changing rapidly. While no breakthrough appears to be imminent, this could change and the position should be watched by those responsible for collecting freight data, and its potential contribution to providing at least background information should be monitored.

A direct feed from firms' own management systems, including full journey descriptions and the types and weights of the commodities transported, could potentially supply more data about the volumes of freight carried and would therefore provide a valuable input to the data collection process. Given the range of data that is held on these systems, this could cause very substantial confidentiality issues, and we do not see this as a fruitful avenue to follow at present although, as in the case of GPS data, the position should be kept under review. In addition, we note that we have been unable to find examples where a direct feed from firms' own management systems has been used overseas, where data collection approaches have been developed over longer periods, suggesting that the time when information may be supplied automatically in New Zealand is at best a substantial way away.

Where firms may be prepared to supply data, the indications are they would want the opportunity to review the information to be provided before its release to a third party, and a direct information feed would therefore not be acceptable. However, the information from these is likely to be in a range of different formats developed to reflect the particular needs of the firms, and so issues of aggregation would still remain.

To cover some of the information gaps remaining, there may be some scope for top-down synthetic modelling based on the total value of industry outputs and possible values per tonne, rather than direct details of the commodity flows, with a process to allocate this spatially to producers and consumers. Because of the uncertainties in this process, it would need to be confined to specific commodities for which no other data is available, and the results should be reviewed critically before they are included in the overall database.

In summary, data on freight movements will have to be obtained from a number of sources with different formats if it is to be comprehensive and accurate. As a result there is unlikely to be any simple process that allows the national patterns of freight movement to be generated automatically from the various sources of information that are realistically going to be available. As a result the production of national freight matrices will always require a substantial element of judgement in putting together the information that is available from the disparate sources. While this exercise will need repeating at periodic intervals, it should be reasonably easy to undertake the updating of key sectors over the intervening period, using readily available statistics for which FIGS would be a suitable repository.

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Appendix A US Commodity Flow Survey

U.S. DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. CENSUS BUREAU

FORM
CFS(07)-2000
(10-02-2006)

2007 Commodity Flow Survey

07200017

DUE DATE:

YOUR RESPONSE IS REQUIRED BY LAW. Title 13, United States Code, requires businesses and other organizations that receive this questionnaire to answer the questions and return the report to the U.S.Census Bureau. By the same law, **YOUR REPORT IS CONFIDENTIAL.** It may be seen only by persons sworn to uphold the confidentiality of Census Bureau information and may be used only for statistical purposes. Further, copies retained in respondents' files are immune from legal process.

Please make corrections to name, address, and ZIP code if necessary.

INSTRUCTIONS:

- **Please refer to the accompanying Instruction Guide for help in answering specific questions.**
- **More information is available at www.census.gov/cfs or at 1-800-772-7851.**

PURPOSE OF THIS SURVEY: To develop information on the characteristics of freight flows in the United States. The information you provide is critical to understanding transportation markets, investment needs and the economic, energy, safety, and security consequences of transportation.

Item A ESTABLISHMENT NAME

Is the establishment name shown above in the mailing address correct?

1 ☐ Yes

2 ☐ No - *Enter establishment name* →

Item B PHYSICAL LOCATION

Is the establishment's physical location the same as shown in the mailing label above? *PO Box or rural routes are not physical locations.*

1 ☐ Yes

2 ☐ No - *Print physical location below*

Number and street

City, town, village, etc. | State | ZIP Code + 4

If you entered a different location above, please complete the form for that location.

Page 2

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Item C OPERATING STATUS

Which of the following best describes this establishment's operating status during the week of

_____ ?

1 ☐ In operation

2 ☐ Temporarily or seasonally inactive

3 ☐ Ceased operation - *Enter date ceased operation* → Date (MM-DD-YYYY) ☐☐ - ☐☐ - ☐☐☐☐

Item D TOTAL NUMBER OF OUTBOUND SHIPMENTS

For this survey, it is important to obtain information about a sample of the outbound shipments made from this establishment.

*An outbound shipment in this survey is defined as a movement of commodities from your establishment to another **single** location. If a truck makes multiple stops on a delivery route, please **count each stop as one shipment.***

- Remember to include only outbound shipments from your physical location (label address or physical location in Item B).
- Also include customer pick-ups, parcels, and all other outbound shipments.

1. What was the total number of all outbound shipments for this establishment the week of

_____ ? . . . . . Total number of outbound shipments ☐☐☐☐

Estimates are acceptable.

For further information, refer to the Instruction Guide, page 2.

2. Did you enter 40 or fewer shipments above?

1 ☐ Yes - *Skip Item E and report all outbound shipments in Item F, pages 4-7.*

2 ☐ No - *Continue with Item E, on page 3.*

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Item E SAMPLING INSTRUCTIONS

In order to avoid asking you for information regarding all of your shipments, we will only ask about a sample of them. This section will help you **identify your sample of shipments.**

1. Using the table below, mark the row that includes the total number of outbound shipments reported in Item D, and the corresponding "report every" number.

Number of outbound shipments reported in Line 1	Report every...	Mark (X) one
1-40	Report every outbound shipment	
41-80	Report every **2nd** outbound shipment	
81-100	Report every **3rd** outbound shipment	
101-200	Report every **5th** outbound shipment	
201-400	Report every **10th** outbound shipment	
401-800	Report every **20th** outbound shipment	
801-1600	Report every **40th** outbound shipment	
1601-3200	Report every **80th** outbound shipment	
3201-6400	Report every **160th** outbound shipment	
6401-12800	Report every **320th** outbound shipment	
More than 12800	Call Census at 1-800-772-7851 or go to www.census.gov/cfs	

2. Using your full set of shipments records for the week named in Item D, follow the steps below.

Step 1. Count until you reach the "report every" number marked above.
Step 2. Select that record.
Step 3. Report that record in Line 1 of Item F, pages 4-5.
Step 4. Continuing with the next shipment record, count until you reach the "report every" number again.
Step 5. Select that record.
Step 6. Report in Line 2 of Item F, pages 4-5.
Step 7. Repeat this process until you have gone through your full set of shipment records.

3. Report these selected shipments in Item F.

Example: If an establishment reported 150 shipments in Item D, it would correspond to the range of 101-200 in the table above, and every 5th outbound shipment record would be selected. This means the establishment would count 5 shipment records, select that record, and report it in Item F. Continuing with the next shipment record, the establishment would count 5 shipment records again, select that record, and report it in Item F. The establishment would repeat this until it had gone through the full set of shipment records for the week named in Item D.

For further information, refer to the Instruction Guide, page 3.

Page 4

07200044

Item F **SHIPMENT CHARACTERISTICS**

NOTE: Each line runs across pages 4 and 5. After entering column H data on page 4 for any line, continue with column (I) on page 5 for the same line.

Line No. (A)	Your Shipment ID Number (B)	Shipment Date (C) Month	Shipment Date (C) Day	Shipment value (excluding shipping costs) in whole dollars. *Estimates acceptable.* (D)	Net Shipment Weight **in pounds** (E)	SCTG commodity code from accompanying booklet (F)	Commodity Description (G)	If a hazardous material, enter the "UN" or "NA" number (H)	*Continue with column (I) on page 5*
0	**123-5**	**4**	**26**	**224,235**	**4840**	**34520**	**Mechanical machinery**		→
00	**402H**	**4**	**26**	**1,375**	**50,125**	**20222**	**Sulfuric acid**	**1830**	→
1									→
2									→
3									→
4									→
5									→
6									→
7									→
8									→
9									→
10									→
11									→
12									→
13									→
14									→
15									→
16									→
17									→
18									→
19									→
20									→

07200058

U.S. Destination or U.S. Exit Port *(Complete for all shipments.)* (I)			Mode(s) of transport to U.S. destination. ***Enter all that apply in order used. Use codes at bottom.*** (J)	* Intermodal shipment? (Y/N) (K)	Export? (Y/N) (L)	Foreign Destination (for export shipments only) **Note:** In column (I) enter the U.S. port, airport, or border crossing of exit. (M)		Export mode (N)	Line No. (O)
City	State	ZIP Code				City	Country		
Los Angeles	**CA**	**90040**	**2, 4**	**Y**	**Y**	**Beijing**	**China**	**6**	0
Newark	**NJ**	**07105**	**4**	**N**	**N**				00
									1
									2
									3
									4
									5
									6
									7
									8
									9
									10
									11
									12
									13
									14
									15
									16
									17
									18
									19
									20

Mode of transport codes for columns (J) and (N):

1 - Parcel delivery, courier, or U.S. Parcel Post
2 - Private truck
3 - For-hire truck
4 - Railroad
5 - Shallow draft vessel
6 - Deep draft vessel
7 - Pipeline
8 - Air
9 - Other mode
0 - Unknown

*** Intermodal shipments (column K):** include Trailer on Flat Car (TOFC), Container on Flat Car (COFC), and Intermodal (IM or ISO) tank.

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07200066

Item F **SHIPMENT CHARACTERISTICS - Continued**

NOTE: Each line runs across pages 6 and 7. After entering column H data on page 6 for any line, continue with column (I) on page 7 for the same line.

Line No. (A)	Your Shipment ID Number (B)	Shipment Date (C) Month	Shipment Date (C) Day	Shipment value (excluding shipping costs) in whole dollars. *Estimates acceptable.* (D)	Net Shipment Weight **in pounds** (E)	SCTG Commodity Code from accompanying booklet (F)	Commodity Description (G)	If a hazardous material, enter the "UN" or "NA" (H)	*Continue with column (I) on page 7*
21									→
22									→
23									→
24									→
25									→
26									→
27									→
28									→
29									→
30									→
31									→
32									→
33									→
34									→
35									→
36									→
37									→
38									→
39									→
40									→

07200074 Page 7

U.S.Destination or U.S. Exit Port *(Complete for all shipments.)* (I)			Mode(s) of transport to U.S. destination. ***Enter all that apply in order used. Use codes at bottom.*** (J)	Intermodal shipment? (Y/N) * (K)	Export? (Y/N) (L)	Foreign Destination (for export shipments only) **Note:** In column (I) enter the U.S. port, airport, or border crossing of exit. (M)		Export mode (N)	Line No. (O)
City	State	ZIP Code				City	Country		
									21
									22
									23
									24
									25
									26
									27
									28
									29
									30
									31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Mode of transport codes for columns (J) and (N):

1 - Parcel delivery, courier, or U.S. Parcel Post
2 - Private truck
3 - For-hire truck
4 - Railroad
5 - Shallow draft vessel
6 - Deep draft vessel
7 - Pipeline
8 - Air
9 - Other mode
0 - Unknown

* **Intermodal shipments (column K):** include Trailer on Flat Car (TOFC), Container on Flat Car (COFC), and Intermodal (IM or ISO) tank.

Page 8

07200082

Item G MONTHLY VALUE OF OUTBOUND SHIPMENTS

Which of the following represents your best estimate of the total value of all outbound shipments originating from this establishment for the most recently completed month?

1 ☐ Less than $1 Million
2 ☐ $1 Million or more but less than $10 Million
3 ☐ $10 Million or more but less than $40 Million
4 ☐ $40 Million or more but less than $100 Million
5 ☐ $100 Million or more but less than $400 Million
6 ☐ $400 Million or more

Item H THIRD-PARTY LOGISTICS

The next series of questions relates to your use of third-party logistics providers (3PLs).

*A 3PL is **not** a contractor who provides only basic logistics services, such as common carrier trucking and/or public warehousing.*

Rather, a 3PL is a contractor that manages and arranges for the provision of multiple logistics services, including freight forwarding, customs brokerage, contract warehousing, transportation, etc.

1. Does this establishment contract out all or a portion of its logistics activities to a 3PL(s)?

1 ☐ Yes 2 ☐ No - *Go to Contact below.*

2. Which of the following services does the 3PL(s) provide, manage and arrange for this establishment? *Mark (X) all that apply.*

1 ☐ Transportation
2 ☐ Contract warehousing
3 ☐ Cross-docking
4 ☐ Re-packing/consolidation
5 ☐ Reverse Logistics
6 ☐ Management of overall transportation and logistics functions (including dedicated trucking services)
7 ☐ Customs brokerage
8 ☐ Freight forwarding
9 ☐ Inventory control and/or management
10 ☐ Information systems

3. Which of the following best represents the percentage of this establishment's outbound shipments (by weight) which was shipped with the involvement of a 3PL(s) during the last 12 months?

1 ☐ 1 to 25% 2 ☐ 26 to 50% 3 ☐ 51 to 75% 4 ☐ 76 to 100%

Contact Please provide the information below for the contact person regarding this report.

Name - *Please print*

Title - *Please print*

Signature

Area Code - Phone Number - Extension

Please return this survey in the enclosed envelope or send it to:
U.S. CENSUS BUREAU
1201 East 10th Street
Jeffersonville IN 47132-0001

THANK YOU FOR COMPLETING THIS REPORT.

Appendix B UK Continuing Survey of Road Goods Transport – survey form

Department for Transport

Continuing Survey of Road Goods Transport (GB)

COMMERCIAL IN CONFIDENCE

Ref: _____

This information is required under Section 1 of the Statistics of Trade Act 1947

Name and address of registered keeper

Survey week from ☐ to ☐

Registration mark of vehicle ☐

If this vehicle is no longer in your possession, please complete sections 4 and 5 ONLY on the back page and return the form immediately in the envelope provided (See Note 1).

Section 1: Vehicle Details

1. Trailer type (please tick as appropriate)

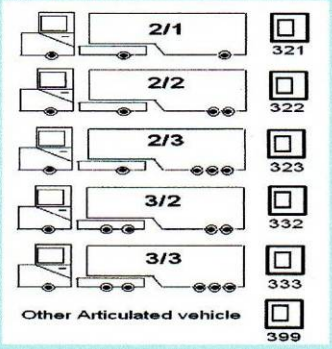
Flat/drop sided	☐	Solid bulk tanker	☐
Box/non specialised	☐	Livestock carrier	☐
Temperature controlled	☐	Car transporter	☐
Curtain sided	☐	Tipper	☐
Liquid tanker	☐	Other	☐

2. (See Note 2)

Gross vehicle weight ☐ kg

Carrying capacity ☐ kg

3. Please tick the box that best describes the **axle configuration**



4. Is this vehicle ever used to carry abnormal loads under a Special Types General Order ?

Yes ☐
No ☐

5. If 'Yes', when under an STGO, what is the gross train weight ?

☐ kg

6. Please state the number of retractable axles that the vehicle has

Tractive Unit ☐

Trailer* ☐

*If more than one trailer is used, describe the one used most often

7. Please state the number of super single tyres that this trailer has fitted ☐

8. Is this trailer a double decker ? (please tick as appropriate)

Yes ☐
No ☐

9. Is the vehicle fitted with any of the following (tick all that apply)

Vehicle tracking system (e.g. GPS) ☐
Fleet management system ☐
On board computer system ☐

NOW PLEASE TURN TO THE BACK PAGE

For official use

T Type ☐ GVW ☐☐☐☐☐ C Cap ☐☐☐☐☐ Axle Con ☐☐☐ STGO ☐ STGO Weight ☐☐☐☐☐

Ret Axle ☐ Ret trail ax ☐ SST ☐ DD ☐☐ GPS ☐☐☐

CSRGT(GB)A (Dft1555)

Section 2: Vehicle Activity

10. Please record the odometer reading at the start of the **first** survey day and the end of the **last** day

Start ☐ End ☐ miles/km*

11. If the tractive unit was not used at all on the public roads during the seven day period of the survey, was this because of:

Not taxed ☐ No work ☐

Repair ☐ Site work ☐

Holiday ☐ MOT/Service ☐

No driver ☐ Other reason ☐

*Delete as appropriate

12. Please give an estimate of the mileage this vehicle undertakes in the UK each year

☐ miles/km*

13. How many litres of fuel were purchased or taken from your own supplies for this vehicle during the survey week ?

Please give the total regardless of the mileage done during the survey week.

☐ gallons/litres*

*Delete as appropriate

Section 3: Business Details

14. Name and telephone number of the person to be contacted if questions arise about this form (please print)

Name ☐

Tel. No ☐

15. Does your firm nationally have a total employment of less than 10 people

Yes ☐ No ☐

16. Please state name of town where this vehicle is based (if different address on page 1)

☐

17. Was this vehicle mainly being operated during the survey period (See Note 3)

On own account ☐ For Hire/Reward ☐

What is the nature of your business ?

☐

Section 4: Change of possession

If the vehicle has been scrapped or stolen, please give the date this happened — Date scrapped/stolen ☐

If the vehicle was sold before the survey week, please give the date sold and the new owner's details — Date sold ☐

If the vehicle is on hire to someone else during the survey week, please give their name and address ☐

Section 5: Certification

I hereby declare that the information given in this return is complete and accurate to the best of my knowledge

Signed ..... Date .....

BEFORE RETURNING THIS FORM PLEASE ENSURE JOURNEY DETAILS ARE COMPLETED ON PAGE 2

For official use

Odo St	Odo Fin	Not Used	Ann Mile	Fuel	Region	P/O
SIC	Prop Code	Whl Plan	Tax	B Type Code	TAO	Regn Yr	Body Type	Tipper	Survey Week

Page 3

Journeys made on each day with four or fewer stops. Please use accompanying guidance notes to help you complete the journey information

Day of week	Journeys Please give nearest town and county name. If the journey was to or from a dock,airport or rail terminal, please show this (eg, Dover - Docks, Birmingham - rail) and how the goods were transferred (see Notes 4 & 5)		Type of Goods Please describe the goods carried (see Note 6). If the goods are a dangerous substance please code product as shown in Note 7.	Distance travelled *(indicate whether miles or kms by deleting as appropriate)		Weight of Goods Carried If empty put zero, if unknown please estimate - (see Note 8)	Please tick if more than 90% of available space was filled with this load	Please tick if the load was limited by weight	MOA (how carried - see Note 9)	No of trailer axles, if trailer not as Q3 (see note 10)	Please tick if load was carried under STGO
	Origin	Destination		Loaded miles/km*	Empty miles/km*	Kilogrammes					

Journeys made on each day with increasing or decreasing loads with five or more stops

Day of week	Journeys Please give nearest town and county name. If the journey was to or from a dock,airport or rail terminal, please show this (eg, Dover - Docks, Birmingham - rail) and how the goods were transferred (see Notes 4 & 5)		Type of Goods Please describe the goods carried (see Note 6). If the goods are a dangerous substance please code product as shown in Note 7	Distance travelled *(indicate whether miles or kms by deleting as appropriate)		Please give name of town of furthest stop made from origin	Total Weight of Goods Delivered (See Note 8)	Total Weight of Goods Collected (See Note 8)	Number of Stops for Delivery only	Number of Stops for Collection only	Number of Stops where both a Delivery and Collection were made	MOA (how carried - see Note 9)	No of trailer axles, if trailer not as Q3 (see Note 10)
	Origin	Final Destination		Loaded miles/km*	Empty miles/km*		Kilogrammes	Kilogrammes					

Page 2

Appendix C Swedish Commodity Flow Survey -- survey form 1 February 2009 (in English)

Translated from the original regulation, in Kammarkollegiets författningssamling, reference KAMFS 2009:1 and SIKAFS 2009:1 (reproduced courtesy Trafikanalys).

Please note that blank pages and continuation sheets for sections A and B have not been included in this appendix.

Information given here is confidential according to Chapter 9, Paragraph 4 of the Secrecy Act (SFS 1980:100)[1]
This survey is compulsory according to the Official Statistics Act (SFS 2001:99) together with SIKA's[2] regulation SIKAFS 2009:1
Questions 4 and 9 are voluntary.

Commodity Flow Survey
2009

KAMFS 2009:1
SIKAFS 2009:1

[space for address label]

DFO/FU
Commodity Flow survey

Send in the requested information as soon as possible.
Log in to www.insamling.scb.se or send in the form in the enclosed envelope.

User ID:
Password:

For SCB[3]

Measurement Period: *[to be filled in by SCB]*
The measurement period is valid even if it falls during public and other holidays

1. Has the above workplace undertaken some activity in the measurement period?	☐ ☐ ☐	Yes No, workplace is inactive → *go to question 9* No, workplace has ceased/been sold → *go to question 9*
2. Has the workplace had outgoing or incoming consignments during the measurement period? More than one alternative can be chosen A consignment is defined as every unique delivery of goods with the same commodity code, see page 18. Normally one consignment corresponds to one invoice, waybill, or similar.	☐ ☐ ☐ ☐ ☐	Yes, outgoing within Sweden Yes, outgoing to abroad Yes, incoming from abroad Yes, but consignments handled wholly or partly by an external firm No, workplace has no goods handling and does not buy storage or goods handling from an external firm → *go to question 9*
3. Is the workplace address the address for outgoing and incoming consignments?	☐ ☐	Yes No ↓
		Outgoing goods Post code ____ Place name ____
		Incoming goods Post code ____ Place name ____

SIKA

SCB Statistika centralbyrån Statistics Sweden	Postal address	Telephone	Email	Fax
www.scb.se	**701 89 ÖREBRO**	**019-17 65 30**	**insamling.VFU@scb.se**	**019-17 69 77**

[1] *SFS is the Swedish Code of Statutes*
[2] *SIKA is Statens institut för kommunikationsanalys [Swedish Institute for Transport and Communications Analysis], the predecessor to Trafikanalys.*
[3] *SCB, Statistika centralbyrån, is Statistics Sweden*

A Outgoing consignments within Sweden and to abroad

KAMFS 2009:1
SIKAFS 2009:1

Which consignments are to be counted?

An **outgoing** consignment from the workplace/logistics partner is defined as every delivery of goods with the same commodity code to a particular consignee. Supporting documentation can for example be invoices, waybills, or delivery notes. Pay attention to the situation where a common invoice used for a number of deliveries is occasionally used as a supporting document; each individual delivery is to be counted as one consignment.

NB: Shipments within your own industry area shall **not** be counted.

4. How large is the estimated value of the outward consignments for the *previous month* from the workplace or logistics partner?	Amount in thousands of crowns ☐☐☐☐☐☐☐ 000 crowns Example: Two million (2,000,000) is written 2000 Seven hundred thousand (700,000) is written 700.

5. Has the workplace and/or the logistics partner had any outgoing consignments during the measurement period (see page 1)?	☐	Yes ☐☐☐☐ number of consignments
	☐	No → **go to section B on page 11**

How shall the sample be taken?

If the total number of **outgoing** consignments is more than 50 during the measurement period, a sample shall be taken. The workplace itself shall take the sample of which consignments shall be taken into account.

Example: If the total number of consignments is 200, Account for each 5th consignment, i.e. 40 consignments

Total number of consignments	
1 – 50	Account for **all** consignments
51 – 100	Account for **every other** consignment
101 – 250	Account for **every 5th** consignment
251 – 500	Account for **every 10th** consignment
501 – 1000	Account for **every 20th** consignment
1001 – 2000	Account for **every 40th** consignment
2001 -	Contact SCB

6. How many consignments have been chosen according to the sample table and accounted for on the following sheets?	☐	number of consignments

KAMFS 2009:1
SIKAFS 2009:1

6. Cargo type Use the codes on page 19 to describe how the goods were loaded, i.e. the outermost packaging, when it left the workplace/logistics partner. For example if the goods are shipped in a 20ft container [or] in a large container choose code 2. If the cargo type is unknown use code 8.	**8. Sector code** Write the sector code according to page 18. Write the sector that the consignee works in.
7. Mode of transport Write all the modes that are used between consignor and consignee. The transport modes shall be written in the order that the consignment is transported with the help of the letter codes on page 18. The "active" modes shall be coded. For example a truck on a train is coded as Rail. If the goods continue by ferry to or from abroad the code Sea is used in the column "All transport modes outside Sweden. If the transport mode is unknown, write code X	**9. Final destination** For consignees in Sweden, write the post Code. For consignees outside Sweden, write the nearest large place and country code according to the codes on page 19.

	All transport modes inside Sweden 7	Consignees in Sweden: Sector code 8	Consignees in Sweden: Final Destination Post Code 9	All transport modes outside Sweden 7	Consignees outside Sweden: Final Destination Place (nearest large) 9	Country code
	VJ	3	70356			
	J			SJ	WILHELMSHAVE	DE
	V	9	11542			
A01						
A02						
A03						
A04						
A05						
A06						
A07						
A08						
A09						
A10						
A11						
A12						

B Incoming consignments from abroad

KAMFS 2009:1
SIKAFS 2009:1

Which consignments shall be counted?

An **incoming** consignment **to** the workplace/logistics partner is defined as every consignment of goods with the same commodity code from a particular consignor or shipper. The supporting documentation can for example be invoices, waybills, or delivery notes. Pay attention to the situation where a common invoice used for a number of deliveries is occasionally used as a supporting document; each individual delivery is to be counted as one consignment.

NB: Shipments within your own industry **area** shall **not** be counted.

7 Has the workplace and/or logistics partner had any outgoing consignments during the measurement period (see page 1)?	☐	Yes ☐☐☐☐☐ number of consignments
	☐	No → go to section 9 on page 20

How shall the sample be taken?

If the total number of incoming consignments is more than 50 during the measurement period, a sample shall be taken. The workplace itself shall take the sample of which consignments shall be taken into account.

Example: If the total number of consignments is 200, Account for **each 5th** consignment, i.e. **40 consignments**

Total number of consignments

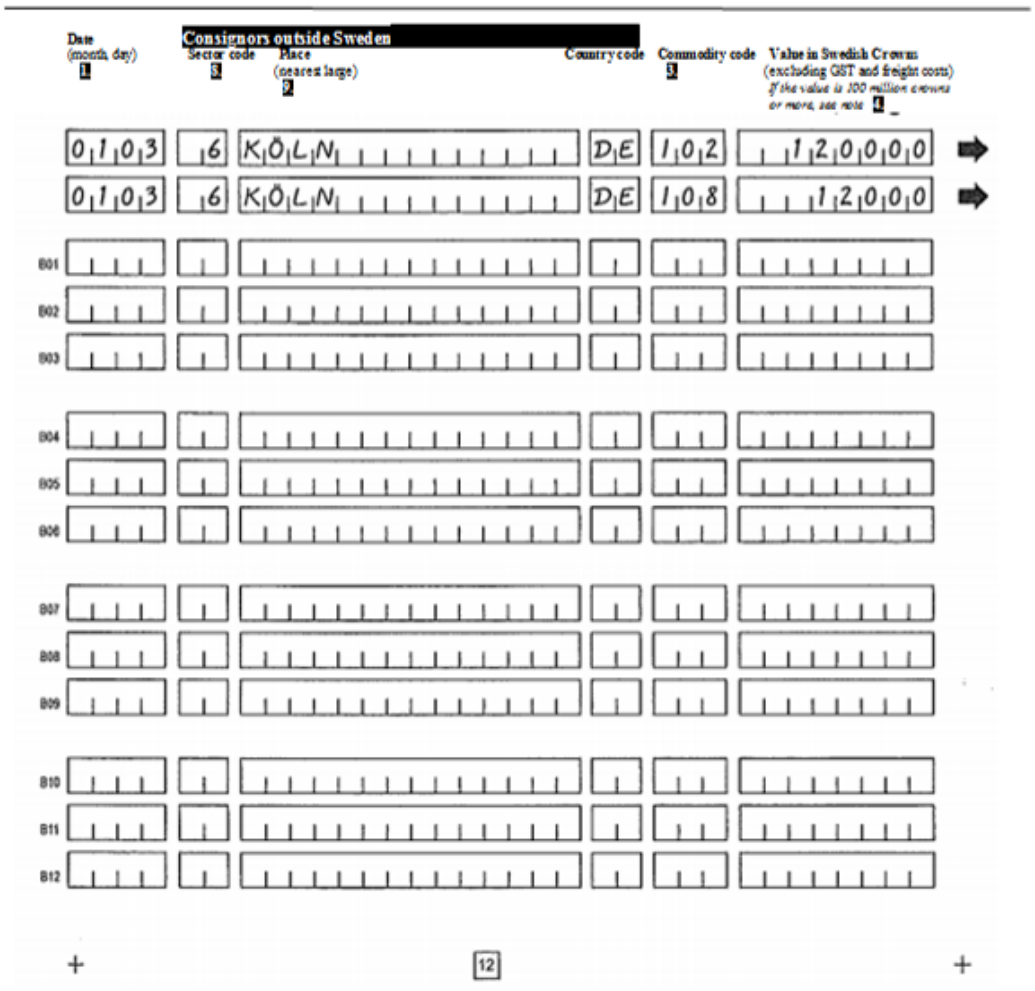
1 – 50	Account for **all** consignments
51 – 100	Account for **every other** consignment
101 – 250	Account for **every 5th** consignment
251 – 500	Account for **every 10th** consignment
501 – 1000	Account for **every 20th** consignment
1001 – 2000	Account for **every 40th** consignment
2001 -	Contact SCB

8. How many consignments have been chosen according to the sample table and accounted for on the following sheets?	☐	number of consignments

KAMFS 2009:1
SIKAFS 2009:1

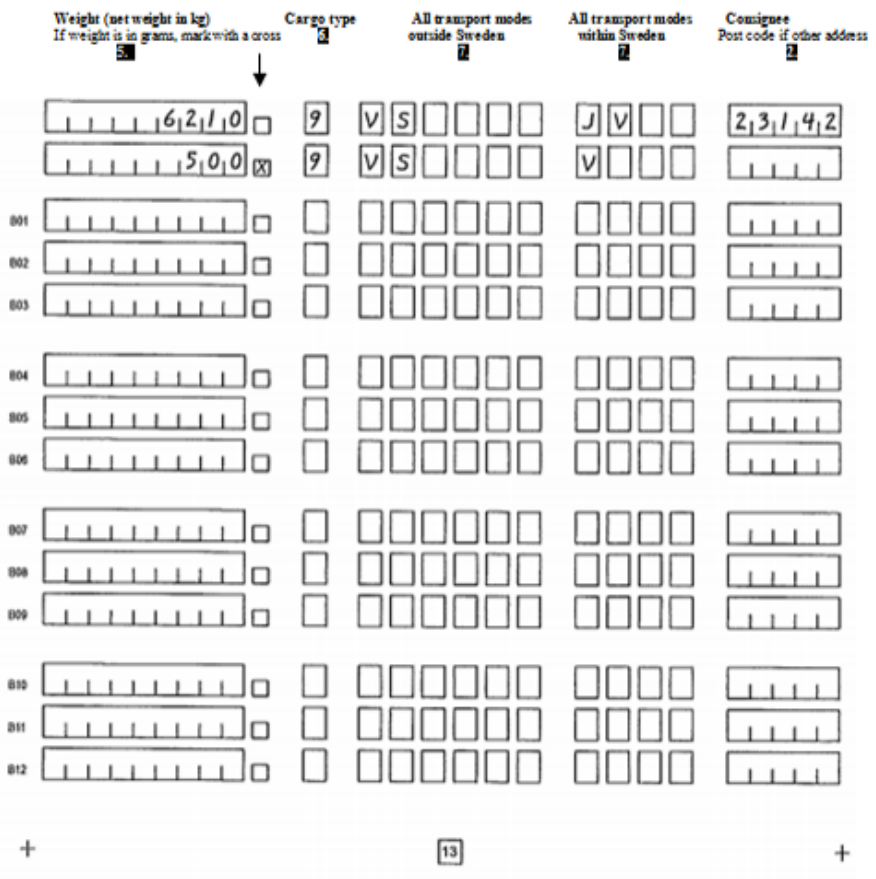
B Incoming consignments from abroad

1. Date Write the date for outgoing consignment or invoice date **2. Post code if other address** Write postcode if consignment is sent to an address other than your ordinary address. That can for	**4. Value** Write the goods' value (invoice value) in Swedish Crowns. Do not include GST and freight costs. If the value is 100 million crowns or more the information must be sent electronically. Log in to **www.insamling.scb.se** and use the log-in codes on page 1. Estimate the value if the invoice value is not available or if freight costs are included in the invoice value.
example be if all accounting occurs at your place but consignment is physically handled by your logistics partner.	**5. Weight** Write the goods' net weight in kg, not weight calculated from freight costs. Weight can be estimated if the weight is not available. Try to estimate weight if you only have access to volume information. If the weight is in grams, mark with a cross.
3. Commodity code Write the commodity code according to the classification on page 18	



KAMFS 2009:1
SIKAFS 2009:1

6. Cargo type Use the codes on page 19 to describe how the goods were loaded, i.e. the outermost packaging, when it left the workplace/logistics partner. For example if the goods are shipped in a 20ft container [or] in a large container choose code 2. If the cargo type is unknown use code 8.	**8. Sector code** Write the sector code according to page 18. Write the sector that the consignor works in.
7. Mode of transport Write all the modes that are used between consignor and consignee. The transport mode shall be written in the order that the consignment is transported with the help of the letter codes on page 18. The "active" modes shall be coded. For example a truck on a train is coded as Rail. If the goods continue by ferry to or from abroad the code Sea is used in the column "All transport modes outside Sweden". If the transport mode is unknown, write code X.	**9. Place** Write the nearest large place and country code according to the codes on page 19



KAMFS 2009:1 **Commodity Group**
SIKFS 2009:1

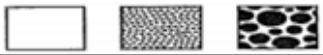
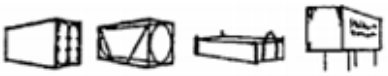
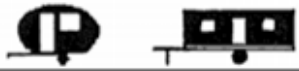
	Products of agriculture forestry and fishing
10	Cereals
11	Potatoes
12	Products of Forestry
13	Raw milk
14	Live animals
15	Fresh fish, fresh fishing product
16	Other forestry products
17	Other substances of vegetable or animal origin
	Crude Petroleum, natural gas and coal
20	Coal and lignite
21	Crude petroleum
22	Natural gas
	Metal ores and other mining and quarrying products
30	Iron ore
31	Other ores than iron ores
32	Chemical and (natural) fertilizer minerals and salt
	Food products beverages and tobacco
40	Meat, meat products, raw hides and skins
41	Fish and fish products, processed and preserved
42	Fruit and vegetables, processed and preserved
43	Animal and vegetable oils and fats
44	Dairy products, beverages and ice cream
45	Grain mill products, prepared animal feeds, starches and starch products
46	Other foods products and tobacco
	Wood and products of wood and cork
50	Products of wood and cork (except furniture)
	Paper and pulp
51	Paper, paper products
52	Pulp

	Solid and liquid petroleum products incl. tar
60	Coke oven products
61	Liquid refined petroleum products
62	Gaseous, liquefied or compressed petroleum products
63	Solid refined petroleum products
	Chemical products
70	Chemicals, chemical products, man-made fibres, rubber and plastic products in primary forms
	Stone, sand and building materials
80	Soil, stone gravel and sand
81	Cement, lime and plaster
82	Other construction materials (not metals or wood)
83	Peat
	Basic metals and metal products except machinery and equipment
90	Basic iron and steel
91	Non-ferrous metals and products thereof
92	Structural metal products and tubes, piped, hollow profiles and related fittings
	Worked goods
100	Textiles, clothes, articles of fur, leather and leathers products
101	Printed and recorded media
102	Pharmaceuticals and parachemicals
103	Rubber and plastic products
104	Glass, and glass products, porcelain and ceramic products
105	Boilers, hardware, weapons and other fabricated metal products
106	Transport equipment
107	Agriculture and forestry machinery
108	Other machinery and apparatus
109	Furniture and other manufacturing goods
110	Household waste, other waste and secondary raw materials
111	Other goods, not earlier mentioned

	Transport mode All transport modes shall be given on the form in the order they occur. The active transport mode is coded, for example: code a truck on a ferry as ferry transport.
V	Road
J	Railway
S	Sea
L	Air
X	Unknown

	Sector Codes In section A write the sector the consignee operates in In section B write the sector the consignor operates in
1	Farming, forestry and fishing
2	Mining and quarrying
3	Wood and paper
4	Pharmaceuticals and other chemical industry
5	Metal working, machinery and transport equipment
6	Building and construction
7	Manufacturing of consumer goods and other manufacturing
8	Wholesale trade
9	Retail trade
10	Private and public services

Cargo Types

0	Liquid bulk goods 	Countries Standard country codes
1	Solid bulk goods 	
2	Large containers, swap bodies and other interchangeable load units, 20ft or more 	
3	Large containers, swap bodies and other interchangeable load units, less than 20ft 	
4	Palletized goods e.g. rollcages, pallets, etc. 	
5	Not used	
6	Self propelled mobile units e.g. motorcars, motorised equipment, live animals, tractors and similar 	
7	Other mobile units not self propelled 	
8	Unknown	ÖA - other Europe ÖB – other Africa ÖC – Asia and Middle East
9	Other cargo types not listed above e.g. boxes, loose packed goods, pre-slung goods	ÖD – other North America, Central and South America ÖE - Oceania

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Comments

9. How long did it take to extract the information and answer the questionnaire?	☐☐☐ minutes

Contact Person

Name (PRINT)	Telephone (incl area code)
Email	Mobile

Thank you for your cooperation

+ 20 +