



The Use of Containers in Canada APPENDICES

**Prepared For
Transport Canada**

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APPENDICES:

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B – Literature Review

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Appendix A – List of Interviews

Port Authorities

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- Prince Rupert Port Authority
- Montreal Port Authority
- Halifax Port Authority

Container Terminals

- TSI, Inc.
- DP World (ex P&O Ports)
- Fraser Surrey Docks
- Coast 2000 Terminals
- Racine Terminal
- Task Terminals
- Termont
- Halterm Ltd.
- Logistec Stevedoring

Shipping Lines

- Maersk Line
- Evergreen Line
- Zim Container
- Hapag-Lloyd AG/CP Ships
- NYK Line
- Hanjin Line
- Hyundai Merchant Marine
- Yang Ming Line
- APL/NOL
- COSCO
- Oceanex

Freight Forwarders and 3PLs

- Schencker
- DHL/Danzas
- AB Transloader

- OCTS
- MTE Logistix

Railways

- CN Rail
- CP Rail

Shippers

- Canadian Tire
- HBC Logistics/Zellers
- Simpson Seeds,
- Saskcan Pulse
- Prairie Pulse
- Walker Seeds
- Sask Pulse Growers
- Belle Pulse
- Vigro Seeds
- Canadian Wheat Board
- Parrish & Heimbecker
- Canexus Chemicals
- Nova Chemicals
- Rahr Malting

Industry Associations & Government

- WESTAC
- Canadian Special Crops Association
- Manitoba Trucking Assoc.
- Alberta Forest Products
- Alberta infrastructure & Transportation
- Latitude/Westrans

Academe

- University of Manitoba
- Université de Montréal
- Dalhousie University

Appendix B – Literature Review

There is an extensive body of literature and research available, particularly in the Canadian context. Because it is so voluminous, we focused on those studies with the most relevance to this project.

Container Shipping Background Studies

The Magic Box: A History of Containerization is a very thorough compendium that deals with the 1960s to the early 1980s. It provides detail regarding the early development of terminals in Montreal, Halifax, Vancouver, Saint John, Quebec City, etc.¹

The Globalisation of the Oceans: Containerisation from the 1950s to the Present is an examination of the container revolution, from earliest times through to late 1990s. It looks at the role of container shipping in globalization and evolution of global supply chains and traces the rise of Asian economies by linking it to the availability of container shipping for shippers both large and small. It shows how well suited it was to the emerging Asian economies of the early 1980s.²

Containerisation International has been the “Bible” of the container industry almost since its inception. The monthly magazine is supplemented by a *Yearbook* as well as other specialty issues, such as the Market Analysis Report: World Container Census 2006. This Market Analysis Report is an excellent source of information regarding the total scope of container usage, both internationally and domestically.³

Literature Review on Intermodal Freight Transportation provides a review of studies conducted in the US on the issue of intermodal freight transportation.⁴ The study indicates that there is no literature on intermodal freight transportation in Canada. The study uses the US experience to identify:

- Analytical tools for project evaluation;
- Intermodal project risks and management approaches;
- Partnership structure and project governance;
- Public policy issues;
- Design of process; and
- Key contractual instruments and project agreements to support intermodal project.

The bibliography includes 95 papers that were reviewed and the vast majority were prepared in the US. It highlights in detail the US *Intermodal Surface Transportation*

¹ Peter Hunter, *The Magic Box: A History of Containerization*.

² Frank Broeze, *The Globalisation of the Oceans: Containerisation from the 1950s to the Present*, Research in Maritime History Series, No. 23, International Maritime Economic History Association, 2002.

³ *Containerisation International Market Analysis: World Container Census 2006*, London, 2006.

⁴ Transport Canada, *Literature Review on Intermodal Freight Transportation*, January 2004.

Equity Act (ISTEA) for the 1998-2003 period, which provided major investment in the public sector. The ISTEA represented \$218 billion of public funding. This study presents the various US programs that have been initiated to address the issue of intermodalism. The authors of the study indicate that Intermodal Surface Transportation requires public funding and planning, considering the limitations of the private structure to plan, design, finance and manage facilities on a national basis. It highlights the fact that the US has established the "Freight Analysis Framework" (FAF) through the Federal Highway Administration (FHWA), which estimates trade flows on the US transportation system and makes geographic relationships between local flows and the overall transportation system. This study indicates that the challenges faced by the US might bring many lessons to Canada. It indicates also that while many Canadian programs benefit intermodalism, Canada should consider elaborating a specific national program to address the issue. It shows that intermodalism is required in a global economy and that to be efficient, the Canadian government should take the lead to assure the integration of measures that will be best suited for the industries, in response to the growth in trade and the need to improve supply chain efficiency. This a very good study, however, analogies between the US and Canada in terms of public programs might be harder to identify. The economy of scale of the US and the trading capacity is by far much greater.

"Client Industries of Water Transportation" is a report undertaken as part of the federal government's initiative to better understand the cumulative impact of federal cost recovery measures, and focuses specifically on the clients of water transportation services. It is based on data collected in 2000. It notes that growth in Canada's containerized movements had grown 60% over the previous seven years, whereas non-containerized shipments had grown 40%. The higher the value of the commodity the more likely it was to move by truck, rail, or air, and lower valued commodities tended to move by water. A "substantial" proportion of Canada's import and export trade is water dependent.⁵

Forecasts

Westac's "Preparing for Success: Forecasting Surface Freight Demand" is based on interviews with six primary commodity groups: coal, forest products, grains, fertilizer and potash, sulphur, and chemicals.⁶ The report provides a number of operational, investment and policy needs. It indicates West Coast container traffic will nearly triple by 2015, to 5.41 million TEUs and coal exports can be expected to more than double. It highlights the general perception among shippers that the degree of use of containers will be determined by the rates, service, and availability of containers. The forecast seems to assume almost exponential and uninterrupted growth in western Canada's major markets.

⁵ Mariport Group Ltd., "Client Industries of Water Transportation," March 2002.

⁶ WESTAC, "Preparing for Success: Forecasting Surface Freight Demand," March 2006.

Another study, “Forecast of Container Vessel Specifications and Port Calls within San Pedro Bay,”⁷ while nominally dealing with the ports of Los Angeles/Long Beach, contains excellent data on the trans-Pacific trades in relation to other major trade lanes such as the trans-Atlantic and Asia-Europe. Some ports on the West Coast could accommodate 12,000 TEU ships but all need improvements to rail yards and rail lines to do so. On the East Coast, only Halifax and Norfolk can handle these vessels. It suggests ship size has to grow beyond 14,000 TEUs to realize any incremental savings because 12,000 TEU+ ships need twin screws. The consultants did not expect the largest ships in the trans-Pacific fleet to exceed 12,000 TEUs by 2020. The trans-Atlantic headhaul trade has grown at a compound annual growth rate (CAGR) of 4.7% from 1990-2003, Asia-North Europe at 10.0% CAGR, and Asia-North America at 9.2% CAGR. Average vessel size had increased by 72% and the total capacity of the global fleet had grown by 308% in the same period.

Policy and Regulatory Issues

“A Review of Regulations Governing Use of International Marine Containers in Canadian Domestic Cargo Carriage: Part I – Project Summary Report”⁸ is a report that examines Canadian and American container cabotage legislation as well as reforms occurring in other countries. The study points out that US legislation allows for 365 days of “unfettered” domestic usage with international equipment, whereas Canadian legislation only allows the container to remain for 30 days duty-free, or 180 within a container pool. The study found the 30-day rule a hindrance to shippers wishing to develop more innovative ways of using empty containers. Four case studies indicated fuel savings and capacity gains if the rule was relaxed. Data obtained for the study indicated 20-40% of marine containers are moved empty through Canadian ports, and that Canadian National (CN) has a daily average of 3,000 empty containers in its western Canadian yards. It recommended a National Cabotage Review Steering Committee be formed and that any additional studies be funded through federal climate change funding.

The April 2006 “Final Report Review Policy Changes for Transportation and Competitiveness”⁹ states the importance of transportation to Saskatchewan, particularly for exports. It also reiterates the importance of transportation as the province transitions to exporting more value-added and identity-preserved products. At the present time, Saskatchewan’s demand for export containers exceeds supply and a system needs to be developed to coordinate supply and demand. It also discusses the issue of running rights.

⁷ Mercator Transport Group, “Forecast of Container Vessel Specifications and Port Calls within San Pedro Bay” February 2005.

⁸ Supply Chain Solutions International and University of Manitoba Transport Institute, “A Review of Regulations Governing Use of International Marine Containers in Canadian Domestic Cargo Carriage: Part I – Project Summary Report,” December 2005.

⁹ Saskatchewan Agrivision, Triticum, Regina Regional Economic Development Corp., “Final Report Review Policy Changes for Transportation and Competitiveness,” April 2006.

The report suggests the country needs a national container freight strategy and increased investment in infrastructure.

In “The *Shipping Conferences Exemption Act*: Review and Suggestions of Positions Appropriate for the Panel,” Trevor Heaver examines issues relating to the *Shipping Conferences Exemption Act*, 1970.¹⁰ This *Act* basically exempted shipping lines from anti-combines legislation and protected the conference system which had been in place for over 100 years. At the time it was passed, the shipping industry was divided between conference and non-conference carriers, i.e. those which operated inside a cartel-like structure and those which operated outside it. Shipping lines now operate within “stabilization” agreements and alliance structures, theoretically giving them massive negotiating power. This power was offset by new capacity entering the trade, and new entrants such as China Shipping entering the marketplace. By 2003, shippers had changed their minds about the *Act* because of changes to the structure and economics of the liner shipping industry. They had also learned (through deregulation of other industries) that the removal of collective pricing could be very beneficial. The author recommends replacing the SCEA with something else more in the interests of shippers and consistent with the interests of the shipping lines and ports.

In “Recent Developments in International Shipping Policy and their Implications for Canada,” Hodgson and Brooks focus on deep sea shipping policy and how Canada’s policy has evolved since the 1960s.¹¹ The authors quote Gunnar Sletmo, who suggested Canada’s de facto shipping policy is to have no policy at all. Canada has had a very laissez-faire approach to international shipping and has always deflected calls to establish cargo reservation policies or a Canadian merchant marine fleet. Canadian shippers have benefited from having a myriad of choice when it has come to shipping products overseas. However, the country has also missed out on opportunities to develop ship management and other aspects of the shipping industry which have been seized upon by countries such as Germany and Denmark.

Another study by Hodgson and Brooks reviews previous work relating to the issue of Canada’s maritime cabotage policy dating back to the 1950s.¹² It then explores recent developments in other developed countries including the EU, Australia, and the US. It concludes by looking at options for Canada’s future domestic shipping policy. It describes the “artificial” barrier between Canada’s domestic and international operations. It concludes there are fundamental flaws in the rationale for application of a 25% duty on imported vessels. In terms of the present study, the section describing the development of Canada’s domestic versus international policy is most relevant.

¹⁰ Trevor Heaver, “The *Shipping Conferences Exemption Act*: Review and Suggestions of Positions Appropriate for the Panel,” CTA Review, 2003.

¹¹ JRF Hodgson and Mary R. Brooks, “Recent Developments in International Shipping Policy and their Implications for Canada,” 2003.

¹² JRF Hodgson & Mary R. Brooks, “Canada’s Maritime Cabotage Policy,” 2004.

Empty Container Movements

The “Empty Container Dynamics Study” is a thorough examination of the movement of empty containers throughout the Vancouver region.¹³ It stresses the need to manage this activity to optimize the overall logistics chain and use road and rail capacity as efficiently as possible. Most stakeholders are very familiar with their own situations but do not necessarily have knowledge or understanding of the system as a whole. The availability of export cargo at the Port of Vancouver provides it with a competitive advantage over US West Coast rivals. One major conclusion was that the storage of empty containers at marine terminals causes congestion during peak periods and impedes overall competitiveness. It was suggested that these could be minimized by reducing dwell times of empty containers and reducing double-handling and empty truck movements. Moreover, importers, exporters and off-dock facilities and truckers do not function as a coordinated system. The report made four specific recommendations: 1) reduce dwell times of empty containers at all marine terminals during peak periods; 2) investigate the costs and benefits of minimizing repositioned empty containers returned by rail; 3) as in 2), but related to truck movements; and 4) relocating some container service to off-dock locations.

The Los Angeles/Long Beach port complex is the largest hub in North America, handling 14.2 million TEUs in 2005. By 2020 it is expected to handle 28 million TEUs. As a consequence, port generated traffic is a major cause of traffic congestion. In “Development of Methods for Handling Empty Containers with Applications in the Los Angeles/Long Beach Port Area,”¹⁴ the authors examined ways to handle empty containers leading to more efficient operations of container transportation. It looks at the possibility of handling empty containers outside the container terminals, because it is predicted that by 2020 the port will handle almost 5 million empties. At the same time, shippers will need 1.9 million empties. It concludes that a system which facilitates the interchange of empties outside ports is desirable and necessary and considers two methodologies: 1) depot-direct; and 2) street-turn. In the first instance, empty containers are stored, maintained and interchanged at off-dock container depots. In the second instance, the container is moved directly from the local consignee to local shippers.

Movement of Containerized Grain in Canada

“The Movement of Grain in Canada: Issues and Measures,”¹⁵ is a presentation which shows the cost differential for source loaded versus port loaded containers. The difference is especially acute in Saskatchewan, whereas it is about 6% in Alberta. It also

¹³ Sandwell Engineering Inc., “Empty Container Dynamics Study,” May 2002.

¹⁴ METRANS Transportation Centre, “Development Of Methods For Handling Empty Containers With Applications In The Los Angeles/Long Beach Port Area: Final Report,” METRANS Project 04-05, March 2006.

¹⁵ Quorum Corporation, “The Movement of Grain in Canada: Issues and Measures,” Presentation, July 2006.

illustrates the percentage value (3%) of Canadian shipments to the container line compared with that of Asian imports. It describes process flows, data flows and the amount of risk exposure and some industry practice that results in sub-optimization of the supply chain. Cabotage is an issue that needs to be resolved even though the rules are loosely enforced. It also points out that special crops are not conducive to whole unit train movement and car allocation is an issue. Other issues and challenges include the suggestion to treat logistics as a profession rather than an administrative burden. There is limited knowledge of the port sector on the part of most grain shippers. Suggested measures include: container movements (statistics and demographics); equipment availability; and velocity and special crops data.

The study “Container Measures Study: Issues and Discussion for Proposed Measures for the Grain Monitoring Program” (on which the above presentation is based) investigates and provides an assessment of the issues and challenges surrounding the movement of speciality crops and grain to export points in Western Canada.¹⁶ The paper provides insights on the logistics of source loading and port loading activities, including a movement economic model based on actual costs and the risks associated with container availability, repositioning and storage, which cause delays to the shippers and increase the risks. It highlights the lack of harmonization in the system's mechanisms (forecasting, operational processes, and communications), that affect the overall efficiency of the supply chain. The Quorum Corp. study indicates that shippers suffer from the absence of direct customer service from the railway companies. Documentation issues (letter of credit, US Customs, CBSA, D3 Regulation, etc.), communication issues and commercial relationships with the railways are risk elements to the shippers. It suggests improvements to the Grain Monitoring Program (GMP) to include containers and to increase the focus on special crops. The study concludes that the overall lack of statistical measures has negative impacts and that additional measures (traffic, movement, and allocation performance measures) are required to improve the overall efficiency of the supply chain performance.

Containerization on the Prairies

In “Exploratory Study of the Alberta Intermodal Containerized Freight System,” the GTS Group examined the intermodal containerized freight system serving Alberta.¹⁷ Most intermodal containerized freight was found to be transported in and out of the Calgary and Edmonton regions where rail intermodal terminals are located, and containerized shipments are most often used for international shipments. West Coast containerized moves are dominated by 40 foot units and an increasing number of 20 foot reefers were finding their way onto the Prairies from Australia and New Zealand. Shipping lines were expecting to see fewer containers moving inland with more being transloaded or going to

¹⁶ Quorum Corp, “Container Measures Study: Issues and Discussion for Proposed Measures for the Grain Monitoring Program,” *Report of the Grain Monitor: Supplemental Program*, June 2006.

¹⁷ GTS Group International, “Exploratory Study of the Alberta Intermodal Containerized Freight System,” June 2004.

Distribution Centres in Vancouver. This results in fewer marine containers being available in Alberta, Saskatchewan and Manitoba. About two-thirds of shippers and one-half of third parties interviewed indicated they used international steamship service. Domestic intermodal was used by 38% of system users. Factors limiting growth of outbound intermodal containerized shipments were: 1) availability of temperature controlled equipment; 2) global sales efforts; 3) acceptance of Alberta's food and agricultural products; and 5) exchange rates. Price was a factor, as was service reliability; availability/suitability of equipment was also cited. Intermodal was not used when on-time performance was important. Issues facing Alberta's containerized shipping system included: 1) terminal access; 2) congestion; 3) volume/capacity; 4) container handling; 5) customs/security; and 6) labour, among others.

“A Look at Container Stuffing Locations” examined whether Alberta's exporters load their containers at source (source loading) or whether they send their goods to a location closer to the port (port loading).¹⁸ The study found that the majority (57%) of Alberta shippers source load their products into containers, compared with 47% who transloaded near a port facility. This practice was unevenly split among various commodity groups: 56% of grain, pulse and feed shippers source loaded, while only 4% of forest product and 80% of industrial producers did. The main reason shippers did not source load was the availability of containers. In order to obtain a better supply of containers, better forecasting was needed on the part of the producer/shipper.

In “Peace Region Access to Container Transportation: Restructuring a Northern Alberta Rail/Road Intermodal System,” the authors examine the potential for extending rail-based container service into the Peace River region.¹⁹ At the time of study, container transportation was used primarily for exports through BC ports by truck via Edmonton and thence to port terminals in Vancouver. There is a relatively high volume of lower value, cost sensitive cargo available in the region. Containers are considered attractive for export expansion and identity preservation of agri-food products. It was also determined that the cargo was not sufficiently profitable for CN to provide competitive rates for connecting short lines but that container transportation is beneficial for export base loading to further lower handling costs and divert long haul trucking. It was estimated that the total Peace region market consisted of 13,800 containers ex BC ports and about 800 for East Coast destinations.

The “Feasibility of a Saskatchewan Container Pilot Project” provides an overview of the lack of empty container availability to special crop traders in Saskatchewan.²⁰ This study indicates that improved accessibility of containers would enhance the global competitiveness of Saskatchewan based shippers. This study examines the feasibility of running a container pilot project with the objectives of increasing the awareness and

¹⁸ Charlene Sych, “A Look at Container Stuffing Locations” (no date).

¹⁹ ProLog Canada Inc., “Peace Region Access to Container Transportation: Restructuring a Northern Alberta Rail/Road Intermodal System,” March 2003.

²⁰ Logistic Marketing Services, “Feasibility of a Saskatchewan Container Pilot Project,” July 2001.

improving the logistics of container placement in the province by coordinating the transactions among the key players. The proposed solution includes:

- Costs of expanded uses of containers compared to the current system;
- Transportation logistics and communications system requirements for Saskatchewan;
- Viability of container rail loading points;
- Establishment of peak shipping periods; and
- Recommendations.

Of notable interest, most container lines were not aware of the future growth potential of value-added agriculture in Saskatchewan. The province was seen to be at a transportation disadvantage compared with Australia, but not elsewhere in the world. It was estimated that there would be demand for 15,100 TEUs of West Coast pulse exports from Saskatchewan by 2007 and a further 17,000 over the East Coast. The study examined empty moves from east to west through Saskatchewan and found that about 16,000 containers traversed the province empty in 2000. It was found that a site in Saskatoon would minimize the amount of road miles required to move containers to an intermodal yard.

In “Assessment of Overseas Container Service: Issues and Opportunities for Saskatchewan Exporters,” DDC Consulting Services estimated that \$500 million of Saskatchewan products are shipped in export containers annually.²¹ Most of the shipments are agricultural products such as pulse crops, high protein feeds, and barley, as well as farm machinery, pulp, meat, and foodstuffs. It indicates that 175,000 containers leave empty from Vancouver to Asia, while an estimated 35,000 to 50,000 containers are exported from Saskatchewan, of which over half are loaded at port. The study estimates that the use of containers for grain shipping represents a saving of approximately \$15 per tonne. However, it also states that the cost of shipping a 20-foot container of grain to Asia varies from US \$800 to US \$1,500. The study also indicates that transloading at the port (Prince Rupert and Vancouver) adds \$18 to \$50 per tonne. Offshore exports represented \$3.7 billion or 36% of Saskatchewan's export trade in 2003. The annual transportation bill is \$100-150 million. The report details a number of key issues: 1) empty container shortage; 2) repositioning of empty containers; 3) specialized container shortages; 4) transportation rate sensitivity; and 5) scale economies. Suggestions for addressing the issue included: 1) creating shipper consortium; 2) working with Prince Rupert to develop a second corridor; 3) enhancing inland container port operations; and 4) developing a Saskatchewan distribution hub.

²¹ DDC Consulting Services Inc., “Assessment of Overseas Container Service: Issues and Opportunities for Saskatchewan Exporters,” December 2004.

Western Container Studies

A recent study in Kamloops examines the potential to build an inland terminal at Kamloops, in the BC interior.²² It would offer re-load facilities, storage, or customs facilities for containerized, break bulk, and bulk cargo moving by rail to the Port of Vancouver. The main opportunity is to transport lumber and pulp products. Approximately 43,000 TEUs of container volume originates from this region on an annual basis. Anticipated benefits would include reducing the number of trucks on the TCH, increasing efficiency and capacity at the Port of Vancouver, reducing costs for export shippers, etc. Challenges include obtaining rail cooperation and buy-in, access to empty containers, and logistical challenges (i.e. the necessity for JIT shipments and competitiveness of trucking direct to port).

The "North Dakota Strategic Freight Analysis" is a very relevant study in terms of the present exercise.²³ At the outset, it states that intermodal truck-rail transportation offers two distinct advantages: 1) it allows combining the better service characteristics of truck with lower rates of rail; and 2) it increases the ease of shipping internationally. It also states the North Dakota commodities ideally suited to container movements include value-added wood products and furniture, industrial and agricultural machinery, and products such as soybeans and confection sunflowers, as well as organic and identity preserved grains. The benefits of intermodal transportation are many, including: lower logistics costs; increased productivity; reduced congestion on highways; reduced energy emissions; increased safety; and opportunities for new business growth and diversification.

Atlantic Region Studies

MariNova Consulting Ltd. has been involved in two studies that are relevant to this project. "The Greater Halifax Distribution Study"²⁴ examined the potential to attract distribution centres to the Halifax region. It concluded that due to the region's small population base of just 2.4 million people, it was not likely to attract this type of activity, but that transload operations offered more potential. Since the study was completed in 2004, two companies have established transloads in the area. The idea is to balance import containers coming back empty to Halifax from Toronto, with eastbound trucks that were going back to central Canada empty. The transload operations afford the opportunity for containers to stay in Halifax where they can be loaded with exports.

²² Advanced Technology Centre, "Opportunity Assessment for an Inland Intermodal Container Facility in Kamloops," September 2006.

²³ Upper Great Plains Transportation Institute, "North Dakota Strategic Freight Analysis," November 2002.

²⁴ MariNova Consulting Ltd., "Greater Halifax Distribution Study," 2004.

Another MariNova study, the “Halifax Inland Terminal and Trucking Options Study,”²⁵ examined the issue of heavy container-laden trucks travelling city streets and the potential use of CN’s rail cut through the city to be used as a rail and truckway. This option was found not to be possible, but the study proposed that an inland terminal be built about 15 kms from the southend container terminal and that rail shuttles be operated for local traffic. It would be located in an area close to major distribution and warehouse facilities and offer some synergies with that sector.

A similar study has been completed for a transport node in Moncton, New Brunswick, but the study has not been released.

Academic Studies

The Transport Institute at University of Manitoba study “A Mixed Logistics Strategy for Grain: The Competitiveness of Containers versus Bulk”²⁶ provides a review of the logistical aspects of bulk and containerized shipping systems and of the historical context. It highlights the transportation requirements for IP grain and GMOs and indicates a cost saving of \$3 to \$5 per ton for backhauled containers versus bulk shipping from Vancouver to Asia. It provides an overview of the recent changes in the grain industry:

- More smaller numerous independent buyers;
- IP Grain;
- GMOs;
- GMO Free;
- JIT;
- KVD; and
- Trade imbalances.

This study compares the economic aspects of bulk versus containers and highlights the advantages and disadvantages of both systems in addressing the markets. It also highlights the trade imbalances and presents the cost elements of both systems. This study is limited to the shipping of grain commodities, however it provides a rational approach to the transportation issues by comparing the two systems.

In the article “Multicommodity network flow model for Asia’s container ports,” the authors pay most attention to Asia-Europe and Asia-North American trade, however this paper demonstrates the importance of intra-regional trade within the Asian port system.²⁷ For some ports this is becoming a very large portion of the cargo they handle and should not be ignored. It occupies terminal space and impacts on the intermodal system.

²⁵ MariNova Consulting Ltd., “Halifax Inland Terminal and Trucking Options Study, 2006.

²⁶ The Transport Institute – University of Manitoba, A Mixed Logistics Strategy for Grain The Competitiveness of Containers versus Bulk,” October 2002.

²⁷ Loo Hay Lee, Ek Peng Chew, Leng Siang Lee, “Multicommodity network flow model for Asia’s container ports,” *Maritime Policy and Management*, September 2006.

The paper “The time factor in liner shipping services” describes how container shipping lines have developed (or at least aim to develop) liner service networks characterized by low operating costs, high frequencies, fast transit times, and both tight and reliable voyage schedules.²⁸ Container shipping has made possible just-in-time production and store replenishment. The paper offers an analysis of transit times and schedule reliability, and identifies and evaluates sources of delays. In a narrow approach, the transit time can be defined as the number of sailing days on a port-port basis. In a broader logistics chain approach, the transit time is the total time on a door-door basis, including dwell times at terminals and drayage to and from the shipper.

A European article, “Southern European Ports and the Spatial Distribution of EDCs,” states the creation of a borderless trade area in the EU in the early 1990s led to a different network of distribution centres (DCs) and a restructuring of logistics.²⁹ The recent enlargement to 25 countries will lead to a de-concentration of the distribution system, setting up DCs in Eastern Europe. The article points out that inland distribution is becoming a very important dimension of the globalized transport system. Structural changes in logistics have generated new patterns of freight distribution and the regionalization of port-related activities. Manufacturers and retailers outsource logistics handling of their products towards distribution centres located near consumer markets. European Distribution Centres (EDCs) are usually located near producers’ end use markets but many are now being located close to ports to take advantage of or exploit synergies.

²⁸ Theo E. Notteboom, “The time factor in liner shipping services,” *Maritime Economics & Logistics*, 8, 2006.

²⁹ Claudio Ferrari, Francesco Parola & Elena Morchio, “Southern European ports and the spatial distribution of EDCs,” *Maritime Economics and Logistics*, 8, 2006.

Appendix C – Best Practices

The logistics industry is aware of the need to identify best practices using benchmarking techniques. This is a global issue because all maritime supply chains are facing common trends and issues including the need to manage supply chains in order to remain competitive, growth in trade and container traffic, increased congestion on roads, increasing awareness of environmental issues, greater awareness of security, and the development of new technology. These issues have created common challenges, one of which is the need to develop a logistics chain view and the associated management behaviours. The use of Best Practices is one factor that will facilitate the development of a supply chain view.³⁰

For this section, we interviewed two American examples of Best Practice including two Third Party Logistics Providers (3PLs)—PacerStack Train and Midwest Shippers Association. We also reviewed additional literature with respect to supply chain management, site location assessment for DCs, and US planning strategy reports.

Pacer Stacktrain

Pacer Stacktrain is a 3PL provider of transloading and backhaul drayage for both domestic and international containers from the US West Coast and US Midwest. They also service Mexico and Canada, and have been affiliated in the past with APL, which operated the APL Linertrain. The company also provides domestic and international freight brokerage services, warehousing services, and local drayage. It is a publicly held company traded on the NYSE.

This company handles 1 million TEUs annually, over 20% of total containerized rail shipments in North America. It has contracts with various mid-size lines, and \$375 million in annual sales. It has its own equipment, including leased railcars and containers, and provides third party services to warehouses and cross docks. It has 1,858 double stack railcars, 28,231 containers, and 28,697 chassis for 53 foot domestic containers. It operates over 54 ramps, 48 container yards and has the largest domestic container fleet in North America.

Pacer Stacktrain's clients include the auto sector, which represents 20% of movements. Other clients include CH Robinson, General Electric, Sony, Union Pacific, Toyota, Whirlpool, Big Lots, The Scotts Company, Shaw Industries, Owens Corning and Sysco. The company also has 1,000 international clients.

³⁰Trevor Heaver, "Current Trends and Issues in the Maritime Supply Chain," paper presented at the Planning and Transport Research Centre's Industry Conference on Maritime Logistics: Land-side Issues and Opportunities, November 2004.

It has long-term contracts with UP, BNSF, CSX, KCSM and CN. It provides repositioning services to container lines for their units, and in 2005 repositioned 91,628 units, slightly down from 2004 when volumes were 94,827.

Pacer Stacktrain's best practices include:

1. Proactive shipment monitoring;
2. Door to door services, thus they are the agent to provide services;
3. Double stack services;
4. C-TPAT certified;
5. Non-asset based strategy, have numerous agreements with transportation carriers and equipment providers, reduces working capital;
6. Use independent owner operators for trucking;
7. Reposition services for container lines;
8. Multi-lingual capabilities; and
9. Insurance coverage.

They expect rail service delays of two to four days with all rail companies to continue, due to congestion. They compete with rail carriers on domestic container services using the railroads infrastructure.

Midwest Shippers Association

This association was created in 2002 and is based in Minneapolis. It was created to assist smaller operators/growers located in the Midwest to market their identity preserved (IP) products to international markets and provide logistic and educational services to members.

The Association provides the following services to its members:

- Negotiates annual volume contracts with container lines;
- Assists in documentation requirements;
- Issues marine insurance;
- Conducts educational forums; and
- Hosts annual conferences re marketing IP and logistics.

They have similar issues to sourcing containers in the Midwest as Western Canada does. They will book and supply containers to Midwest. Drayage is from Minneapolis to North Dakota or Iowa at US \$600 to \$800 per container. Empties typically are sourced from Chicago with demurrage charges applying at rail yards.

New contracts are to be negotiated with container lines expecting 30-40% increases in rates in Q1 2007, as container lines are renegotiating their current five to ten year contracts with Class 1 carriers in the US.

This Association provides a format and window to smaller shippers and growers who may not want to market products direct to larger grain companies such as Cargill, Cenex

Harvest States (CHS), and Archer Daniels Midland (ADM). Through educational and trade forums, they provide exchange and interaction between both the grower and end users, as they identified marketing as a service they can provide to interested end users. They have had delegates from Japan, Taiwan, and other Asian countries attend their annual conference in Minneapolis.

Their exports are 80% to Japan, 10% to Taiwan, and another 10% to the EU. They also have limited access to funding resources, and thus are very selective as to what activities to engage and invest in, and where they can get the best returns for their members. Most recently, they have been emphasizing marketing and freight contracting services.

Melbourne, Australia

In Australia, especially at the ports of Sydney and Melbourne, port-adjacent and inner-city gridlock is driving the mantra of “more containers on rail.”³¹ Australia’s container terminals are operating within their capacities but their dependence on road and trucking operations is having a major impact on the inner city locations of terminals. The solution appears to be “more containers on rail” but Ross Robinson, author of the paper “Port-oriented landside logistics in Australian ports: A strategic framework,” suggests this is a “coping” rather than a long term development strategy. He suggests a closer look at the “drivers” of landside logistics is called for. There has been a realization on the part of port authorities and terminal operators that control over landside competitive space is where significantly higher margins can be obtained. Value has also migrated from individual corporations to sets of logistics chains. The new value is in the integration of these chains. Three terminal operators have three different strategies at the Port of Melbourne. The most recent entrant has built a new terminal in the inner harbour along with an inland terminal outside the port area.

BTS and FHWA

US state and National Federal Highways (BTS) provide benchmark studies with respect to evaluating transportation flows of containers, rail and truck. There is a model developed by the Office of Freight Management and Operations of the Federal Highway Administration (FHWA) that: 1) estimates commodity flows and associated freight activity; and 2) forecasts changes because of shifts in economic factors, transportation assets, etc. The FHWA is currently enhancing the model so that it will provide better estimates of freight flows and impacts of policy changes, and utilize better data sources. The improved model will be able to provide forecasts up to 2040.³²

³¹ Ross Robinson, “Port-oriented landside logistics in Australian ports: A strategic framework,” *Maritime Economics and Logistics*, 8, 2006.

³² FHWA, DOT, “Freight Analysis Framework: Issues and Plans,” April 2004.

Impact of Shifting Container Flows

Michael McGowan’s article, “The impact of shifting container cargo flows on regional demand for US warehouse space,”³³ identifies how the recent increased flows of containers have increased the need for more intermodal trains to inland locations. The study reviews container flows and how new distribution centres will gravitate towards rail centres such as Chicago, Memphis, St. Louis and New Orleans. The study shows that ten 40 foot containers can be transloaded into seven 53 foot domestic containers, thus resulting in lower costs to shippers and carriers. The paper discusses some strategies of retailers such as Wal-Mart and Target Stores, with respect to locating larger DCs to rural areas for lower wages to offset higher drayage charges.

Another example of best practice evaluates a research paper that developed a model to simulate US container transportation routes for different cargoes through various ports.³⁴ The model compares 14 ports across the US and the areas that they serviced. The model also provides an example of increasing port charges and the impact on where cargo would flow. The model requires international trade patterns, geographical locations of ports, service areas, availability of multi modes, and port costs. The model provides a basis to evaluate spatial change of port service trade areas due to changing trade and economic conditions.

Benchmarking the Performance of Intermodal Transport

The OECD has also published several studies on this subject, such as “Benchmarking Intermodal Freight Transport,” 2002.³⁵ The purpose of this study was to review the issues relating to developing a performance model to assess the relative efficiency of modes/modal combinations and intermodal transfers, and to identify inefficiencies that could contribute to modal choice.

The study outlines a framework for measuring intermodal performance, comparing price, financial issues, transit time, damage, ease of use, technical issues and asset management. It provides a comparison of distance-based to value-based to time-based and the willingness to negotiate between parties in the supply chain. The steps outlined to conduct an intermodal evaluation are as follows:

- Indicators of modal split and intermodal relation for all modes;
- Weights for indicators; and
- Aggregation rule to find one value for evaluation procedure.

³³ Michael McGowan, “The impact of shifting container cargo flows on regional demand for US warehouse space,” *Journal of Real Estate Portfolio Management*, May-Aug 2005.

³⁴ Miffing Lou and Thomas A. Grigalunas, “A Spatial Economic Multimodal Transportation Simulation Model for US Coastal Container Ports,” Univ. of Rhode Island, 2002.

³⁵ OECD, “Benchmarking Intermodal Freight Transport,” 2002.

The indicators that are used for weight need to be relevant, complete and quantifiable. All indicators need to be monetary. They suggest four indicators for simplicity:

1. Price of transportation over total supply chain;
2. Cost of total travel time;
3. Cost of total waiting time; and
4. Value of container load.

Evaluations should be targeted at specific components such as routes or corridors. Geographic groupings incorporating shipping lines, wharves, container yards, access roads should be benchmarked. Data needs to be collected to benchmark components of the supply chain. The study also provides the formula for the Inter-modal evaluation model that can be applied across all modes within the network. Once all the supply chains are compared, the model would identify the most efficient route network.

Australian Data Collection

Access to information and the publication of data used by players within the marketplace provide mutual benefits to stakeholders. In this regard Southern Australia Ports publish key statistics of container flows through their ports comparing imports-exports of containers by container type between 20 to 40 ft and whether the container is used for dry or reefer cargo. The following table shows the reporting structure of containers in Flinders Port Districts.

Port Adelaide containers Sept 2006 by Trade Region

COMMERCIAL Import/Export CONTAINERISED Goods excl. OVERSTOWS in TEUs

Flinders Ports gives no guarantee regarding this information and accepts no liability for any inconvenience, or any direct or consequential loss, arising from reliance upon this information.



Port Adelaide			September 2006										
			Import			Export							
			20ft	40ft	Total	20ft	40ft	Total					
			Dry	Reefer	Dry	Reefer	Dry	Reefer	Dry	Reefer	Dry	Reefer	
AFRICA - SOUTH & EAST COAST	Mauritius	Cereal preparations- n.e.s. ***	0	0	0	0	0	2	0	0	0	0	2
		Chemical products n.e.s.	7	0	12	0	19	0	0	0	0	0	0
		Consignments not classified by commodity	35	0	20	0	55	24	0	0	0	24	0
		Lead- unwrought (i.e. bullion- ingots- pig lead etc)	0	0	0	0	0	1	0	0	0	0	1
		Meat - fresh- frozen or chilled- n.e.s.	0	0	0	0	0	0	4	0	4	0	0
		Peas - field	0	0	0	0	0	1	0	0	0	0	1
		Seeds (of a kind used for sowing)	0	0	0	0	0	2	0	0	0	0	2
		Wool- greasy	0	0	0	0	0	0	0	8	0	0	8
		Meat - fresh- frozen or chilled- n.e.s.	0	0	0	0	0	0	1	0	0	0	1
		Seychelles	Meat - fresh- frozen or chilled- n.e.s.	0	0	0	0	0	0	1	0	0	0
	South Africa	Chemical products n.e.s.	0	0	0	0	0	6	0	0	0	0	6
		Consignments not classified by commodity	0	0	0	0	0	5	0	18	0	23	0
		Copper- worked	0	0	0	0	0	1	0	0	0	0	1
		Furniture- and parts thereof	0	0	0	0	0	1	0	0	0	0	1
		Household appliances and parts- n.e.s. *	0	0	0	0	0	0	0	2	0	0	2
		Lead- unwrought (i.e. bullion- ingots- pig lead etc)	0	0	0	0	0	15	0	0	0	0	15
		Meat - fresh- frozen or chilled- n.e.s.	0	0	0	0	0	0	3	0	38	0	41
		Seeds (of a kind used for sowing)	0	0	0	0	0	0	0	2	0	0	2
		Wine and vermouth	0	0	0	0	0	1	0	0	0	0	1
		Tanzania, United Republic of	Consignments not classified by commodity	0	0	0	0	0	0	0	2	0	0

Empty Container Table Port Adelaide



Flinders Ports gives no guarantee regarding this information and accepts no liability for any inconvenience, or any direct or consequential loss, arising from reliance upon this information.

COMMERCIAL Import/Export EMPTY CONTAINERS excl. OVERSTOWS in TEUs

		September 2006	
		Import	Export
Port Adelaide	AFRICA - SOUTH & EAST COAST	5	0
	EAST ASIA	0	59
	MEDITERRANEAN	0	2
	NEW ZEALAND	220	0
	NORTH ASIA	0	8
	OTHER TRADE REGIONS	0	6
	PERSIAN GULF	0	20
	SCANDINAVIA	0	1
	SOUTH ASIA	0	21
	SOUTH EAST ASIA	239	1026
	WESTERN EUROPE	0	35
Total		464	1178

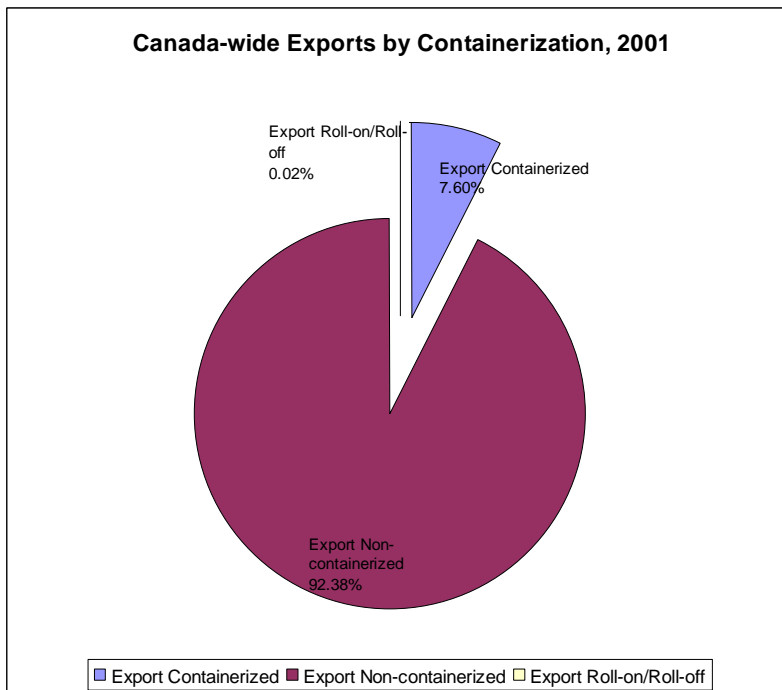
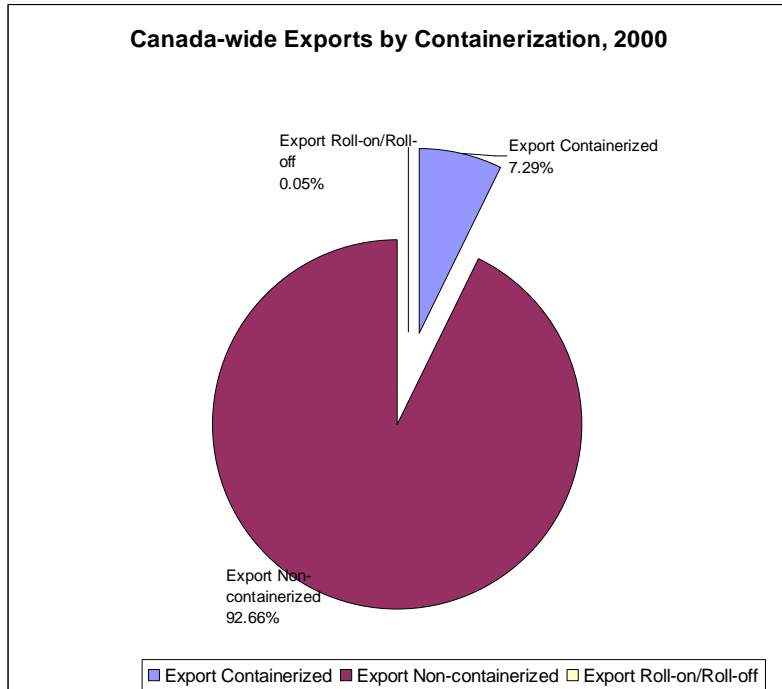
Appendix D – Trade Data

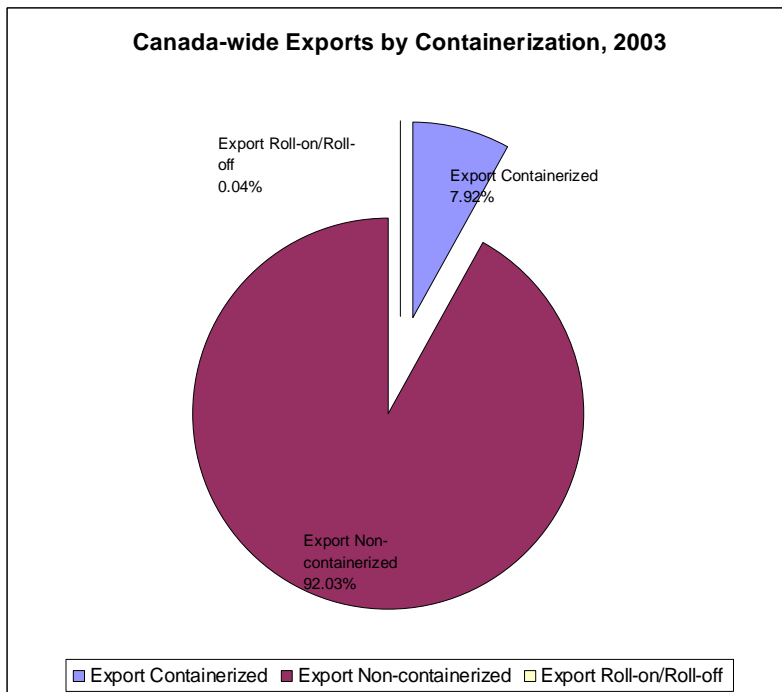
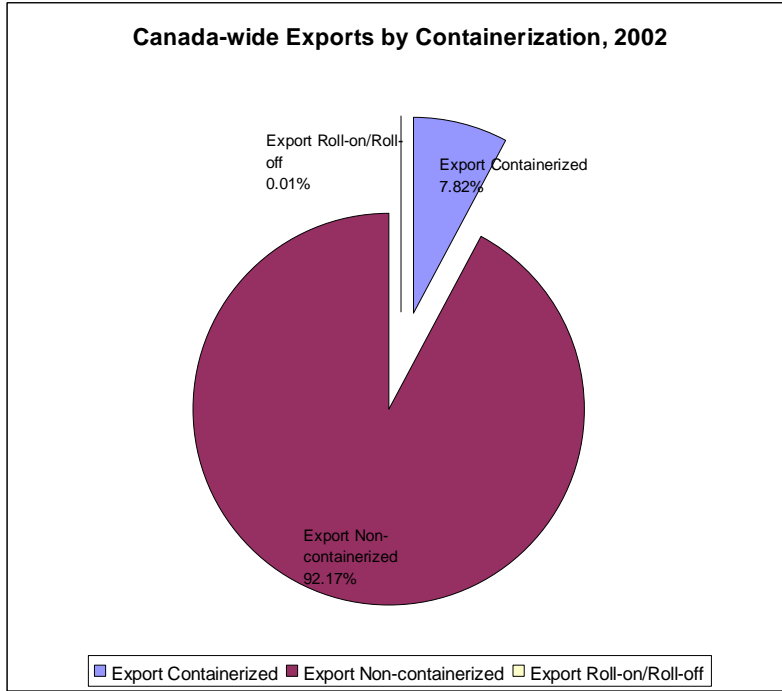
Halifax Imports, Exports, Domestic Tonnage, Containerized, by Commodity Groups

Commodity Description	2000	2001	2002	2003
Sector: Domestic				
Mixed loads or unidentified freight or cargo	79,550.00	87,679.00	94,848.00	91,424.00
Sector: Export				
Alcoholic and non-alcoholic beverages	30,666.00	42,724.61	52,652.97	23,928.14
Animal or vegetable fats, oils and flours	22,050.07	16,996.63	16,332.39	12,622.32
Articles of base metal	55,213.16	49,733.30	30,287.52	35,406.08
Coal coke and petroleum coke	8,240.38	5,633.59	17,158.79	7,705.05
Crude petroleum	906.49	194.85	9.12	19.96
Feed, cereal straw, eggs and other animal products	52,755.86	68,872.53	48,863.93	41,196.55
Fertilizers (excluding potash)	3,183.66	2,860.56	1,778.42	2,070.31
Fresh, chilled or dried fruit and nuts	27,098.77	23,437.97	26,146.38	30,974.58
Fresh, chilled or dried vegetables	174,917.18	165,814.24	79,267.79	97,293.48
Fuel oils	907.01	462.47	1,140.51	789.60
Gasoline and aviation turbine fuel	108.80	82.02	240.11	94.61
Iron and steel – primary or semi-finished	50,112.17	52,342.98	32,832.71	89,781.47
Iron ores and concentrates	281.25	581.35	47.23	569.09
Logs and other wood in the rough	33,163.28	24,903.23	13,236.87	9,103.89
Lumber	58,399.99	63,047.95	61,229.74	57,773.10
Machinery	130,043.72	160,205.65	163,328.44	158,475.68
Meat, fish, seafood, and preparations	240,093.11	277,176.84	293,694.17	286,156.61
Metallic waste and scrap	8,653.08	9,037.77	9,622.92	12,077.22
Milled grain products and preparations, and bakery products	15,713.69	24,511.28	16,806.68	16,610.76
Mixed loads or unidentified freight or cargo	11,568.33	1,149.78	2,695.82	7,505.57
Newsprint	249,609.54	171,563.69	203,679.17	273,266.17
Non-metallic waste and scrap	13,566.27	13,115.47	27,485.09	41,896.94
Other basic chemicals	71,536.98	65,839.36	60,554.66	73,274.26
Other chemical products and preparations	47,074.04	36,316.35	34,306.31	27,365.18
Other manufactured and miscellaneous goods	314,154.33	290,980.19	248,913.99	224,407.81
Other non-ferrous metal – primary or semi-finished	58,195.80	38,214.11	23,098.60	24,338.85
Other non-metallic mineral products	62,625.17	55,774.61	57,461.20	43,614.56
Other non-metallic minerals	188,706.05	173,614.13	160,629.29	140,713.95
Other oil seeds and nuts and other agricultural products	54,387.53	47,864.91	41,672.83	33,022.34
Other refined petroleum and coal products	9,592.97	11,614.02	8,118.81	7,579.65
Other wood products (plywood, veneer)	12,884.22	10,599.49	11,295.66	7,585.54
Paper and paperboard, except printed products	111,988.04	105,913.13	91,938.05	128,071.34
Plastic and rubber	78,894.57	63,954.63	65,207.70	54,474.53
Prepared foodstuffs (not elsewhere classified)	92,215.24	94,122.23	97,141.74	90,125.73
Rye, oats and other cereal grains	2,756.82	2,105.66	1,118.69	1,140.36
Salt	960.61	2,118.31	1,452.60	2,425.40
Stone, sand, gravel and crushed stone	8,405.81	10,166.71	8,169.44	6,663.39
Sugar	3,182.55	4,437.03	5,522.45	3,454.05
Sulphur	8,921.68	15,101.77	14,032.40	12,645.81
Vehicles and parts and accessories	72,211.51	34,385.31	34,683.44	46,968.29
Wheat	1,453.62	2,349.02	169.57	326.65
Wood chips	2,151.80	3,212.73	4,252.86	4,878.51
Wood pulp	57,833.92	91,543.57	140,394.69	152,938.37

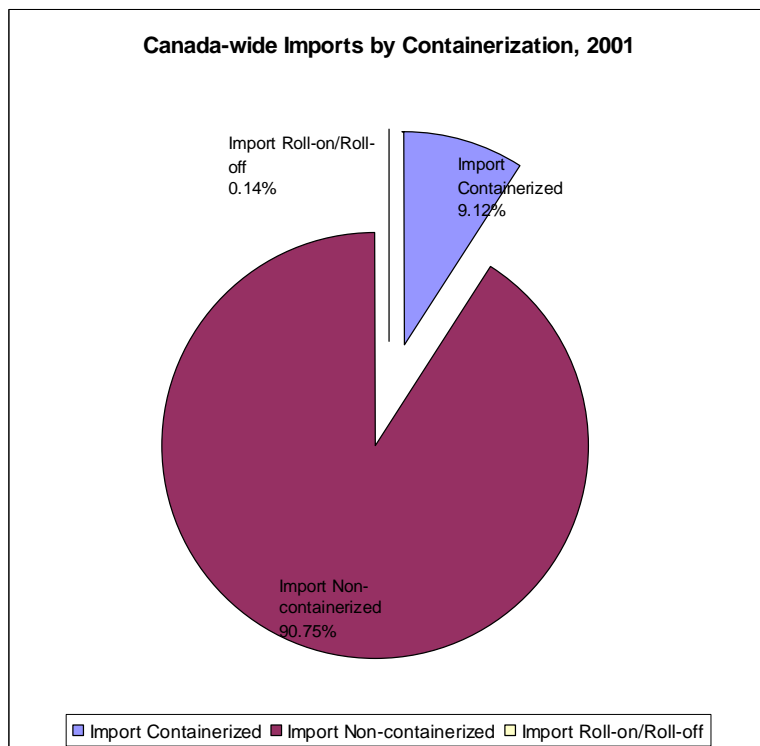
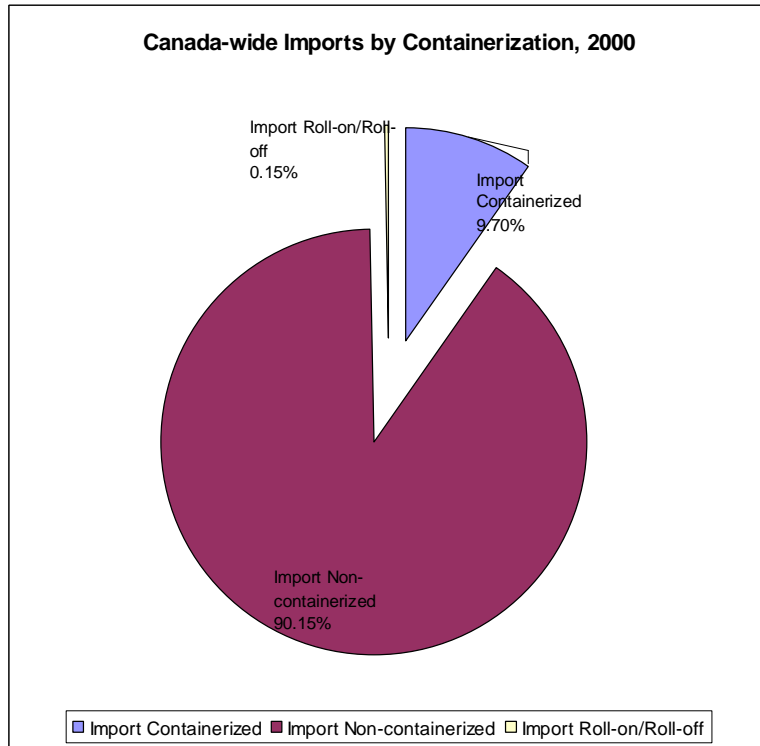
Commodity Description	2000	2001	2002	2003
Sector: Import				
Alcoholic and non-alcoholic beverages	107,120.26	131,382.78	128,115.38	123,986.09
Animal or vegetable fats, oils and flours	19,452.96	19,564.87	21,710.54	26,049.78
Articles of base metal	71,405.80	56,951.16	60,889.68	70,205.35
Coal coke and petroleum coke	403.18	1,362.00	783.01	1,932.58
Crude petroleum	17.43		9.95	49.31
Feed, cereal straw, eggs and other animal products	23,888.40	19,803.25	15,270.56	19,412.05
Fertilizers (excluding potash)	456.49	556.56	326.40	899.29
Fresh, chilled or dried fruit and nuts	4,665.81	5,776.11	5,297.63	11,878.94
Fresh, chilled or dried vegetables	12,224.01	9,254.53	13,302.41	14,255.28
Fuel oils	7.20	127.23	1,106.73	68.83
Gasoline and aviation turbine fuel	90.77		80.11	20.54
Iron and steel – primary or semi-finished	54,226.84	53,497.55	48,334.48	49,823.34
Iron ores and concentrates	549.13	379.63	2,605.41	6,297.02
Logs and other wood in the rough	924.16	2,195.85	1,080.67	619.56
Lumber	7,542.39	9,168.41	13,932.97	12,898.26
Machinery	178,843.10	219,279.00	208,736.48	254,607.47
Meat, fish, seafood, and preparations	60,855.94	72,869.81	54,590.03	88,111.65
Metallic waste and scrap	1,618.39	3,286.88	2,150.60	1,481.13
Milled grain products and preparations, and bakery products	13,134.63	20,499.38	19,020.63	13,820.81
Mixed loads or unidentified freight or cargo	8,665.27	26,162.88	11,693.49	2,848.99
Newsprint	3,046.28	418.79	469.54	84.29
Non-metallic waste and scrap	165.60		21.69	442.90
Other basic chemicals	88,998.83	121,893.94	103,261.00	110,362.73
Other chemical products and preparations	50,793.72	40,751.03	45,332.72	52,827.99
Other manufactured and miscellaneous goods	396,114.43	341,995.70	362,145.25	378,309.93
Other non-ferrous metal – primary or semi-finished	25,316.77	27,714.14	35,592.15	30,290.71
Other non-metallic mineral products	174,808.21	183,699.08	185,214.25	250,362.26
Other non-metallic minerals	192.63	284.13	462.25	421.29
Other oil seeds and nuts and other agricultural products	6,403.02	8,472.91	12,601.74	14,382.30
Other refined petroleum and coal products	926.03	1,600.83	3,537.49	4,032.98
Other wood products (plywood, veneer)	20,871.38	16,476.30	20,836.41	23,394.80
Paper and paperboard, except printed products	49,962.21	45,500.22	53,960.80	57,423.93
Plastic and rubber	103,412.73	112,023.48	126,102.36	122,463.75
Prepared foodstuffs (not elsewhere classified)	197,751.35	203,974.42	202,918.78	211,356.45
Rye, oats and other cereal grains	5,539.80	9,037.73	7,606.92	9,330.57
Salt	99.62	867.58	1,041.97	1,121.95
Stone, sand, gravel and crushed stone	7,409.83	15,212.80	24,243.87	16,789.45
Sugar	189.32	1,486.37	1,732.72	2,758.46
Sulphur	5,557.11	6,711.22	11,219.87	12,763.12
Vehicles and parts and accessories	39,163.81	32,215.06	35,134.57	31,758.28
Wheat	189.83	505.71	179.24	760.89
Wood chips	1,771.77	22.85	1,364.90	44.98
Wood pulp	1,395.81	3,045.51	6,311.54	3,270.08
Grand Total	4,273,107.32	4,248,382.71	4,153,848.94	4,416,776.11

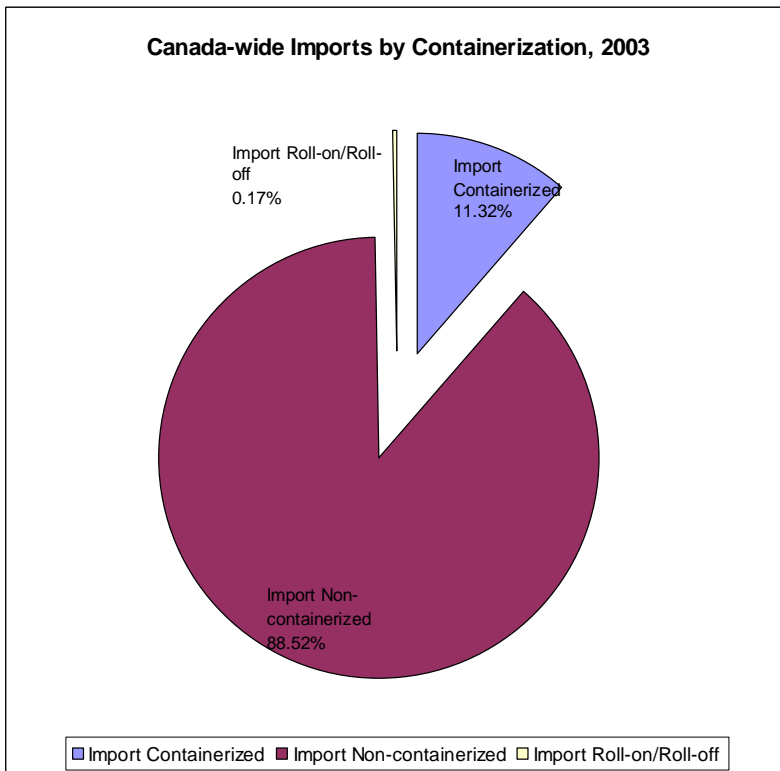
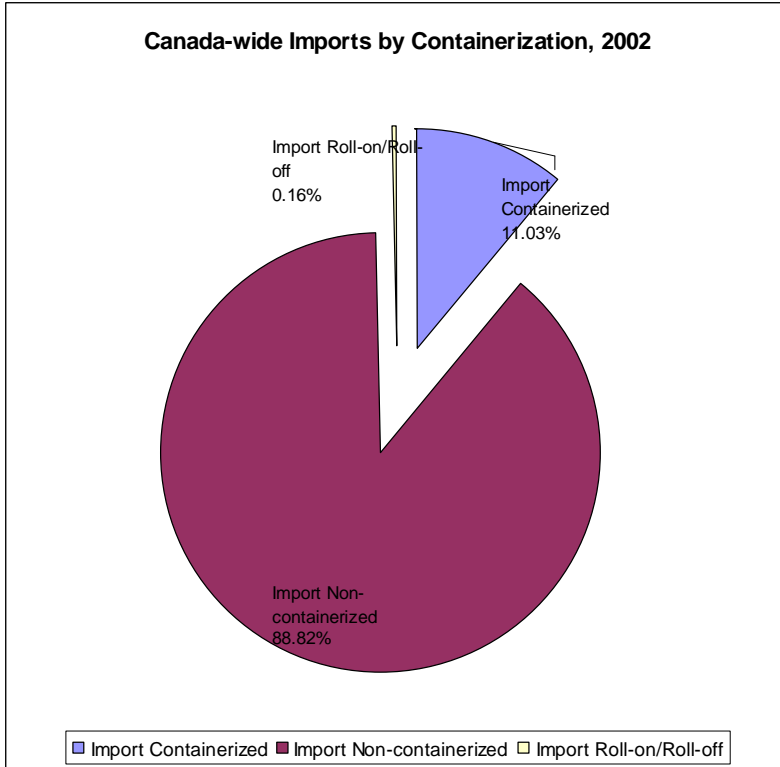
CANADA WIDE Exports



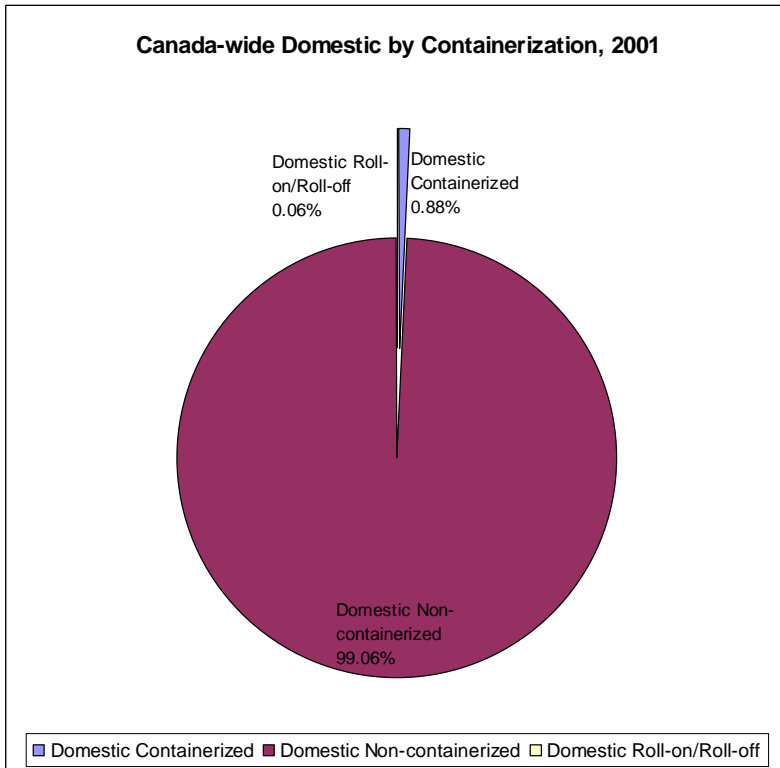
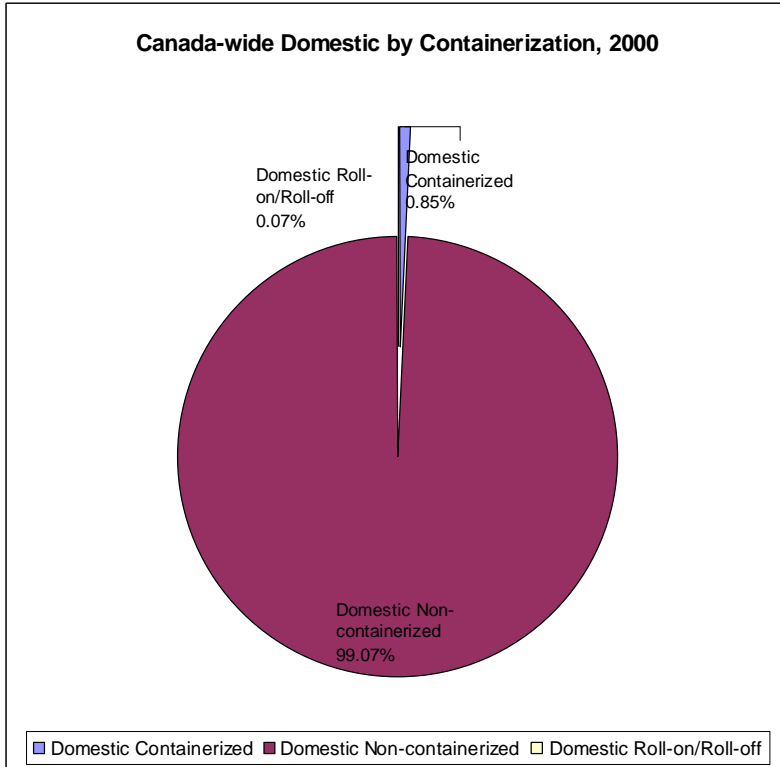


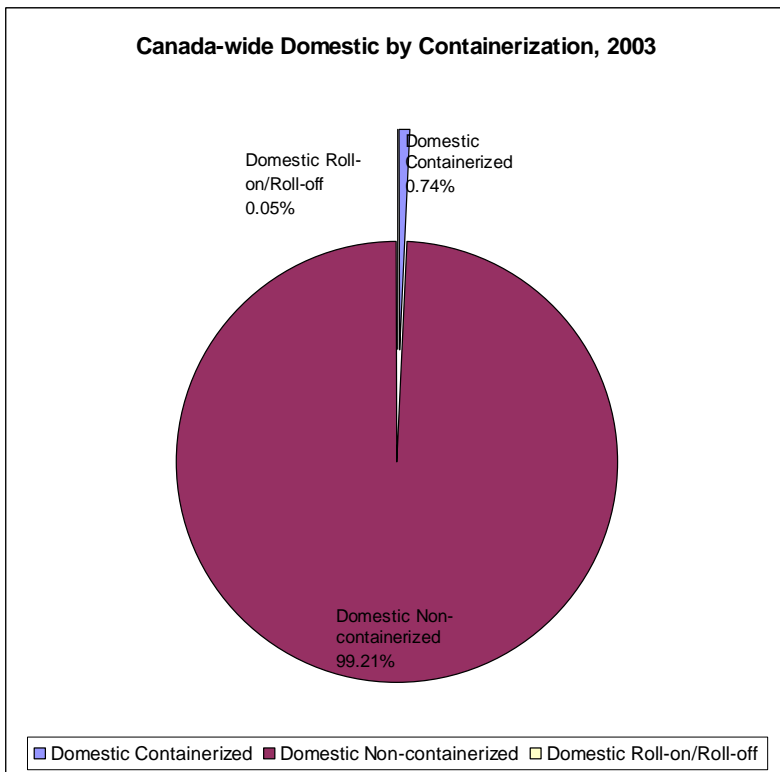
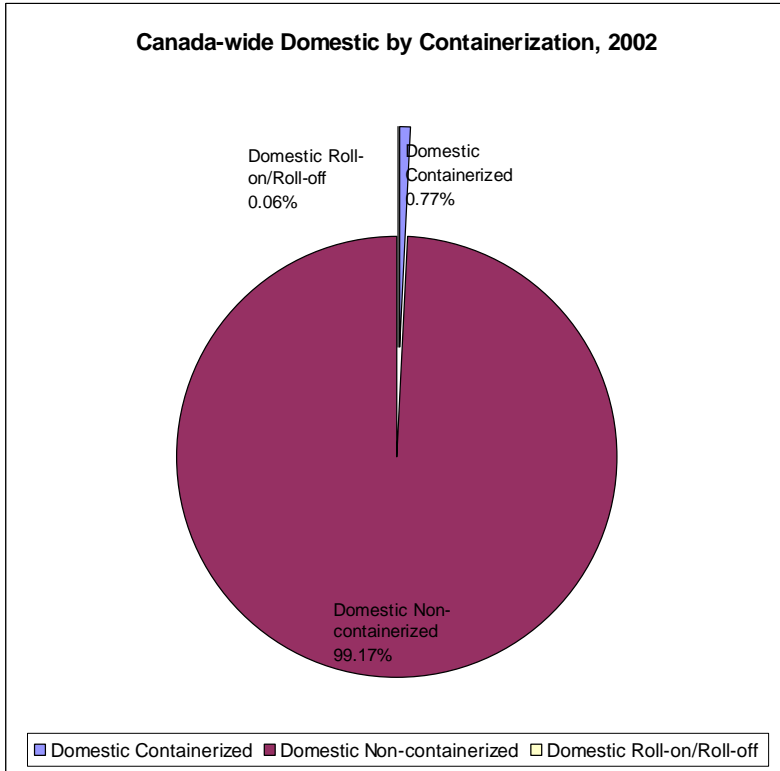
CANADA WIDE Imports





CANADA WIDE Domestic

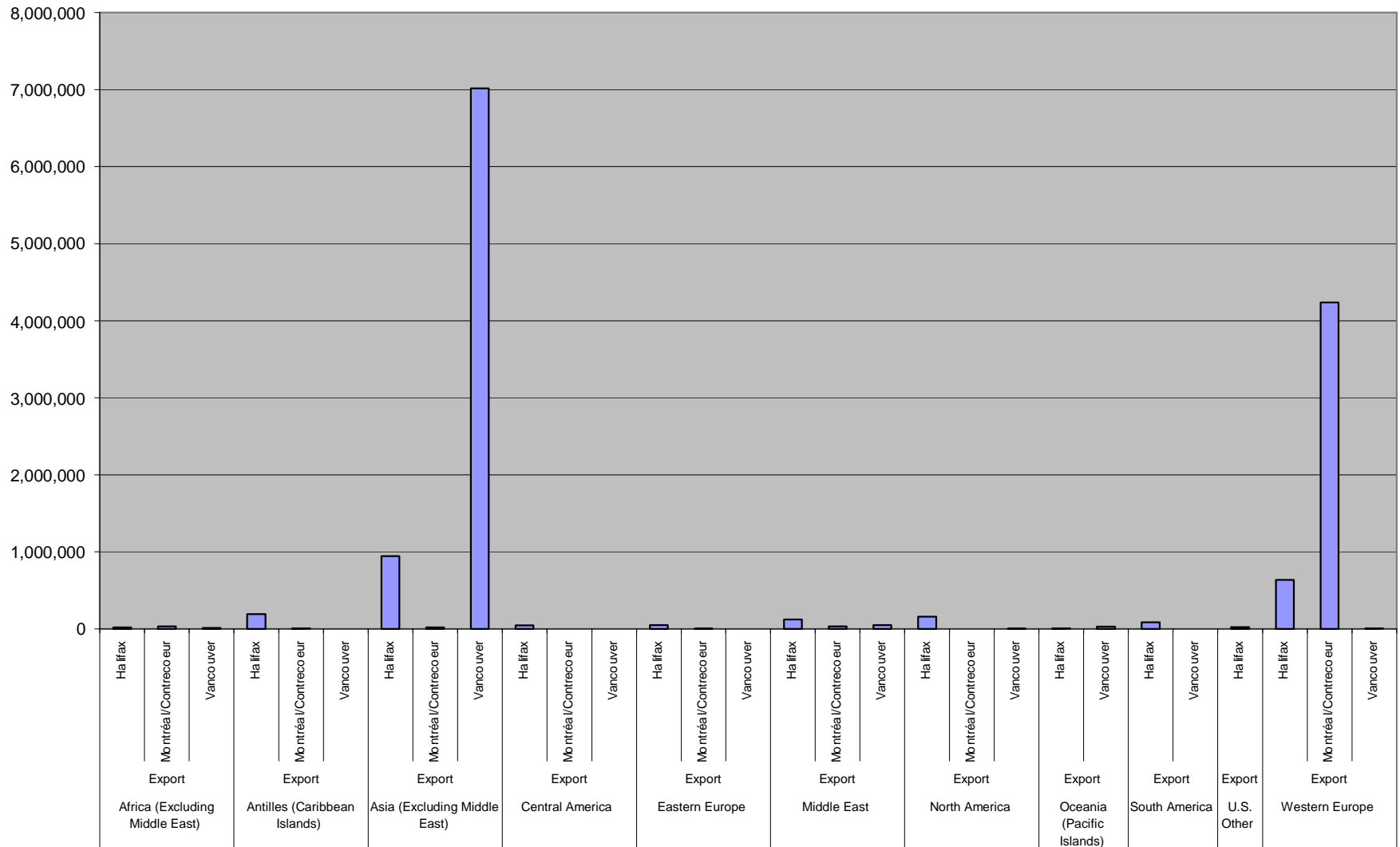




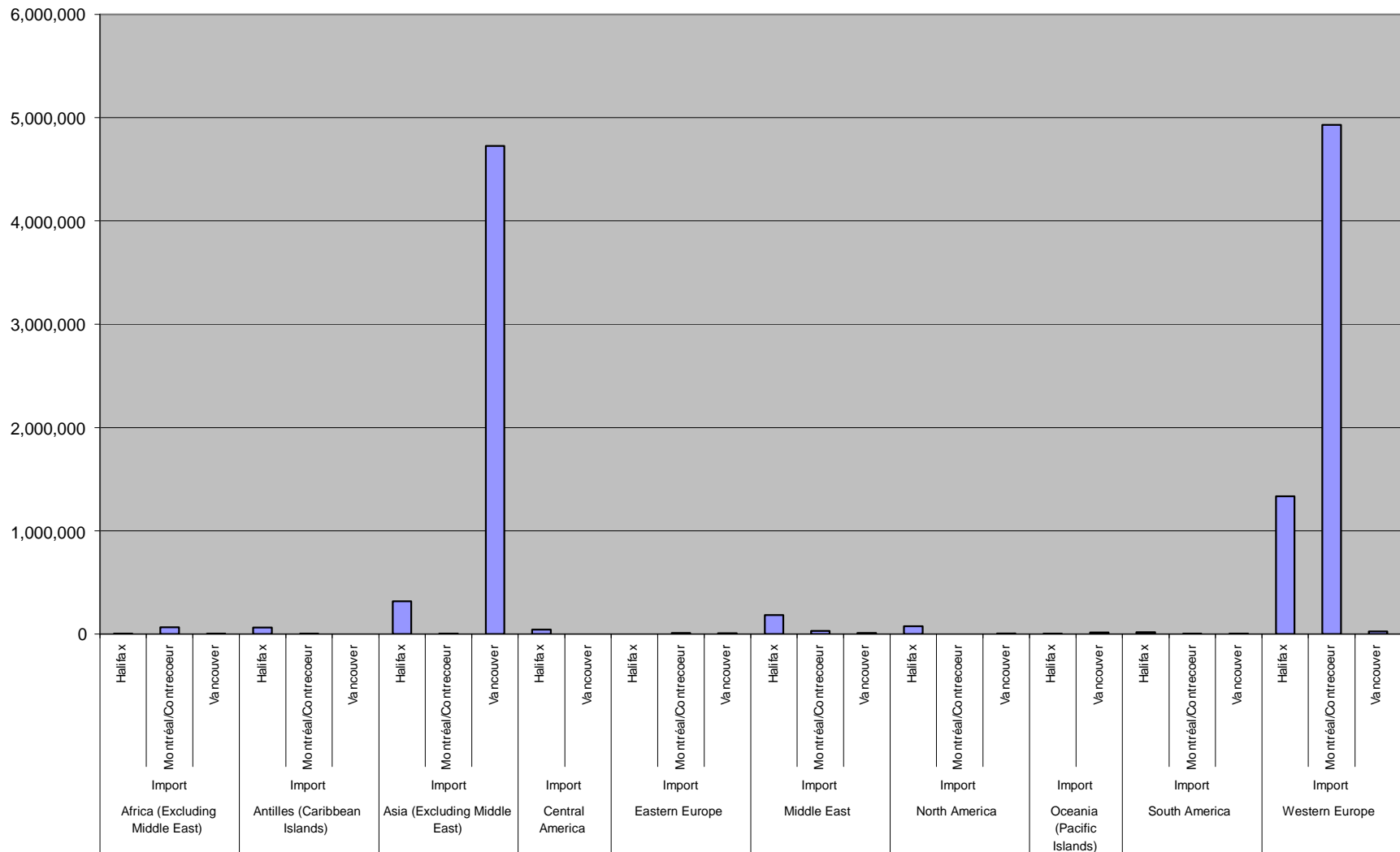
**Exports, Imports and Domestic, Total Tonnes,
by Method of Containerization, 2000 to 2003**

Sum of tonnes			year			
handling port name	container flag	sector	2000	2001	2002	2003
Vancouver	Containerized	Export	6,650,364	6,549,616	6,692,665	7,120,103
		Import	3,340,921	3,535,893	4,567,455	4,793,954
		Domestic				
	Non-containerized	Export	60,479,829	57,150,709	47,313,679	51,257,957
		Import	2,891,624	3,098,138	3,068,196	2,893,695
		Domestic	452,081	445,292	208,848	279,213
Vancouver Sum			73,814,820	70,779,649	61,850,843	66,344,923
Montréal/Contrecoeur	Containerized	Import	4,934,473	4,603,020	5,043,233	5,041,347
		Export	3,939,912	3,794,239	4,055,226	4,335,324
		Domestic	1,408	2,625	2,059	2,159
	Non-containerized	Import	3,880,111	5,105,765	4,025,918	4,688,538
		Domestic	3,932,330	2,366,798	2,532,834	3,102,876
		Export	2,035,978	2,028,317	1,569,056	1,777,305
	Roll-on/Roll-off	Import	9,424	3,272	9,651	7,405
		Export	820	8,083	7,086	7,404
		Domestic	2,681	2,646	1,322	1,834
Montréal/Contrecoeur Sum			18,737,137	17,914,765	17,246,385	18,964,193
Halifax	Containerized	Export	2,447,385	2,334,676	2,208,672	2,291,332
		Import	1,746,172	1,826,028	1,850,329	2,034,020
		Domestic	79,550	87,679	94,848	91,424
	Non-containerized	Import	3,577,982	4,131,752	3,242,649	3,531,447
		Export	3,001,507	2,776,630	3,020,492	3,078,692
		Domestic	898,780	836,804	809,637	1,414,020
	Roll-on/Roll-off	Import	145,299	149,199	159,287	182,749
		Export	99,584	26,946	16,533	72,363
		Domestic	1,030	1,317	2,462	1,279
Halifax Sum			11,997,291	12,171,031	11,404,909	12,697,327
Grand Total			104,549,248	100,865,445	90,502,136	98,006,442

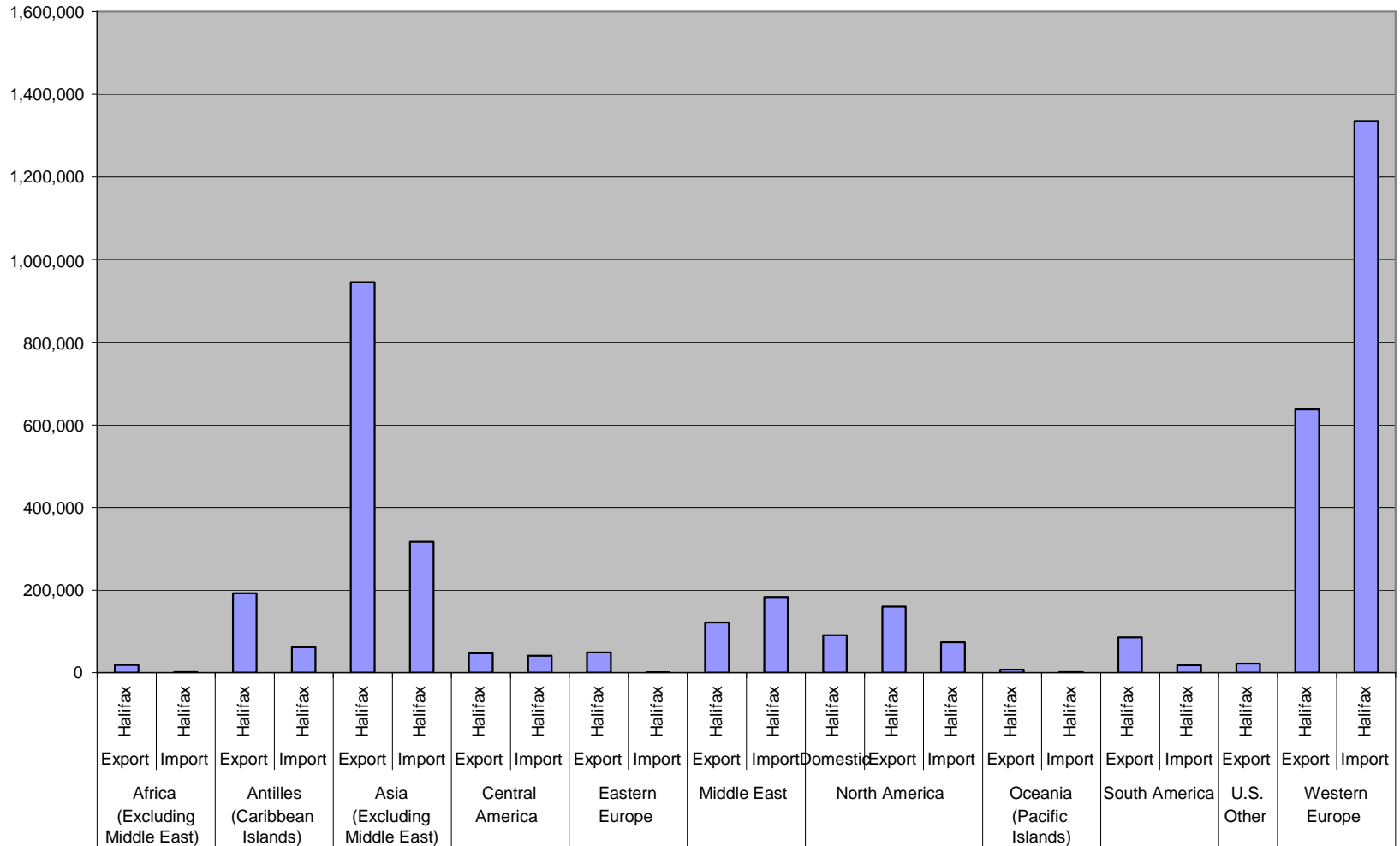
Containerized Exports by Trade Route; Tonnes; Halifax, Montreal, and Vancouver, 2003



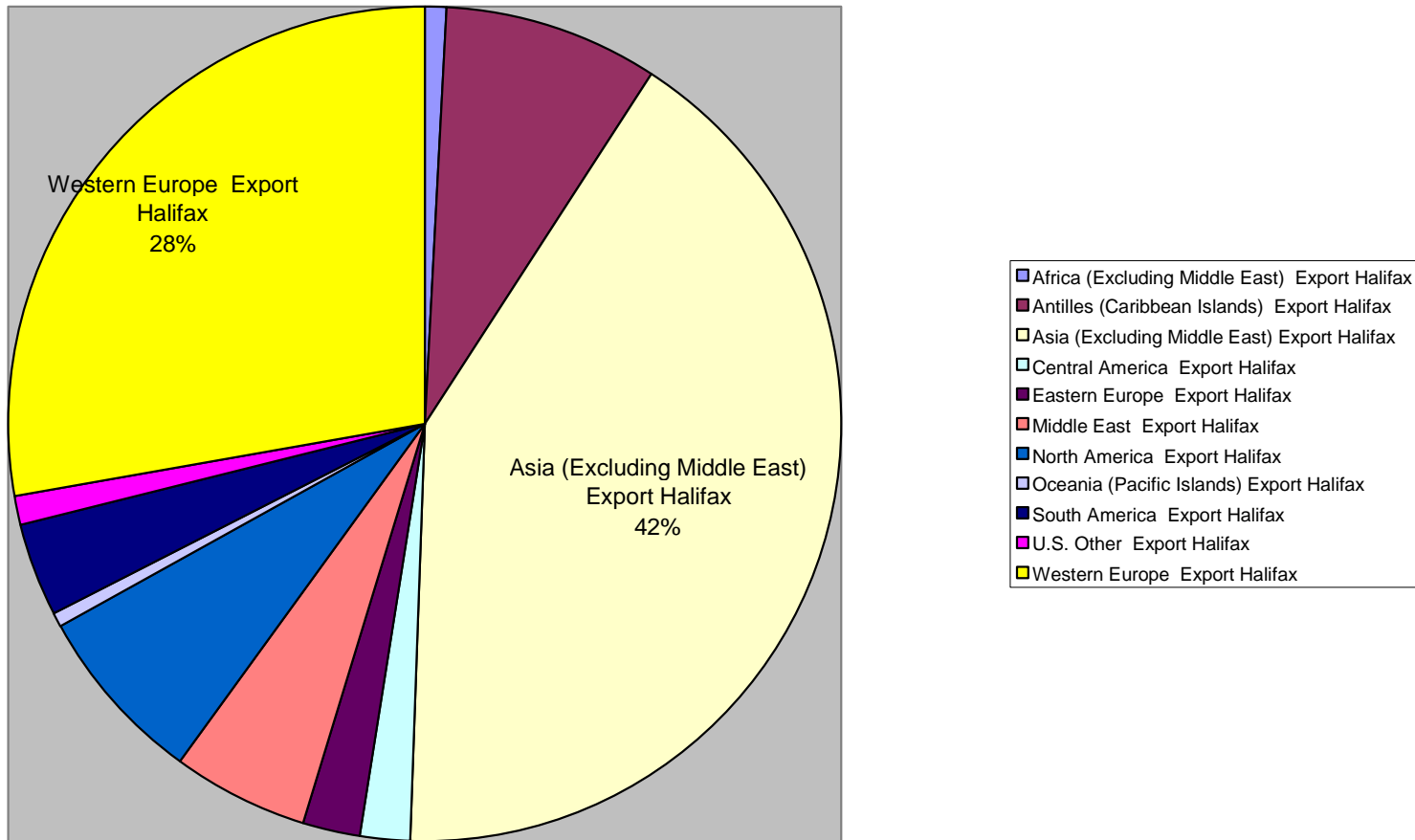
Containerized Imports by Trade Route; Tonnes; Halifax, Montreal, and Vancouver, 2003



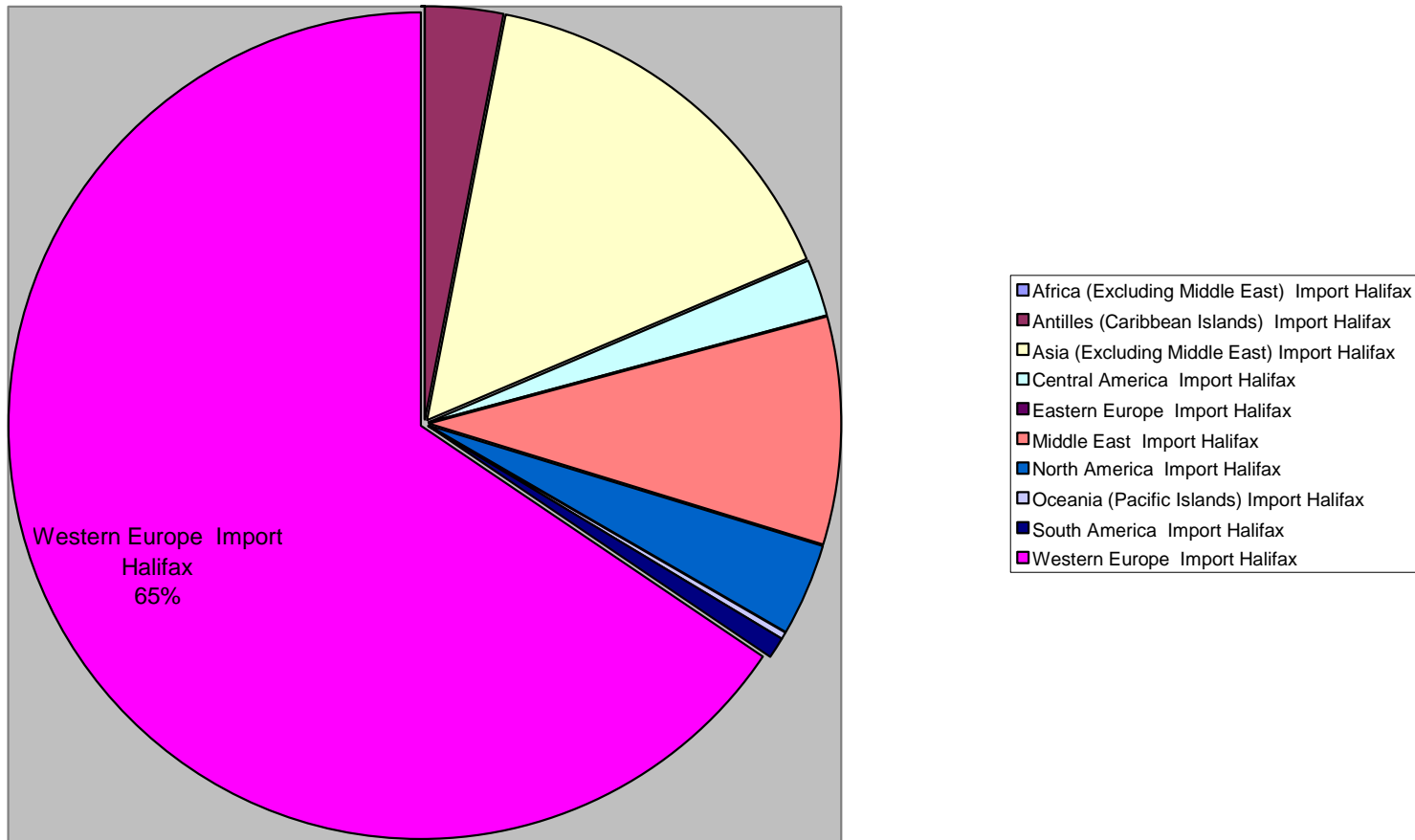
2003 Halifax - Containerized Imports and Exports by Trade Route; Tonnes



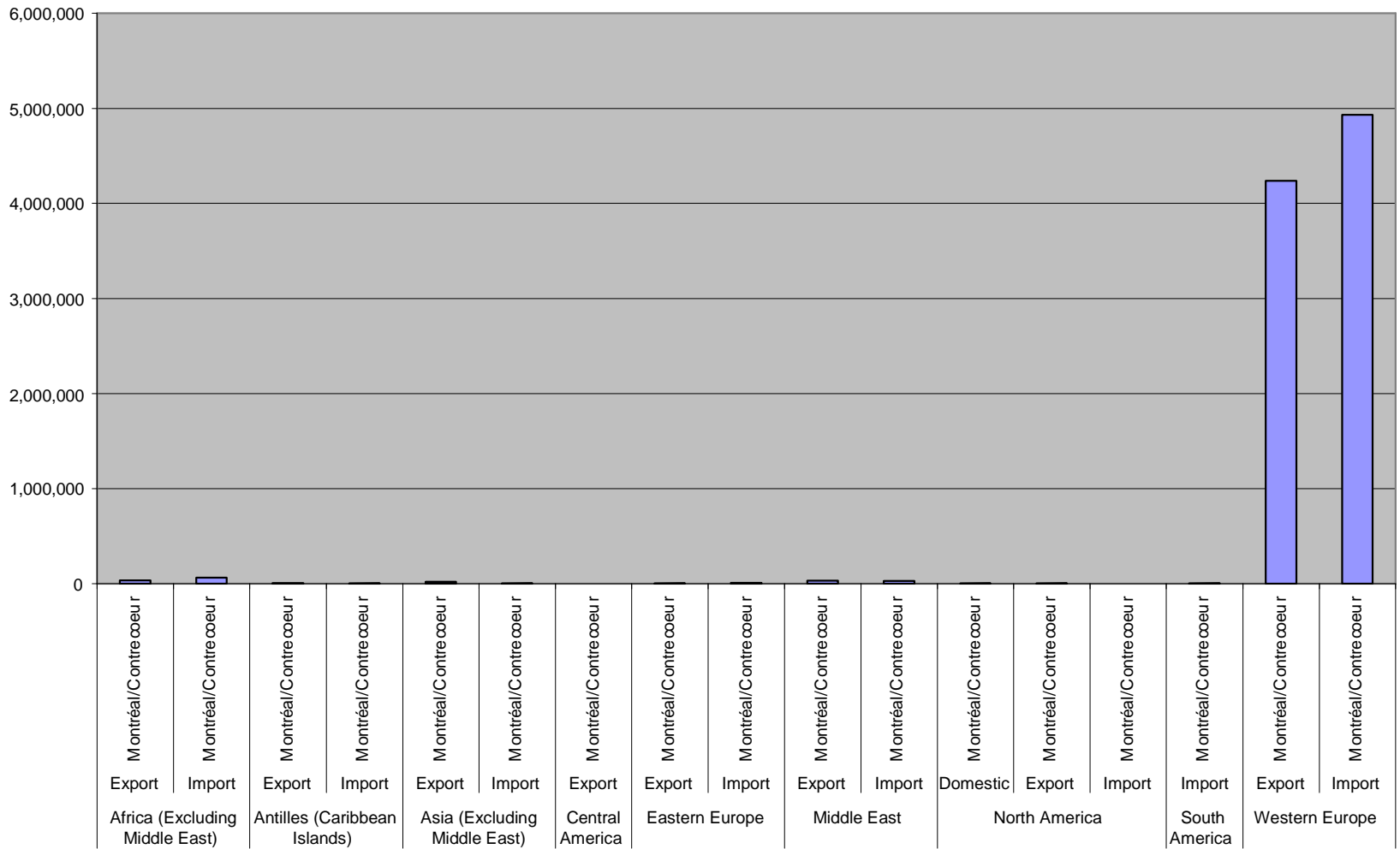
2003 Halifax - Containerized Exports by Trade Route; Tonnes



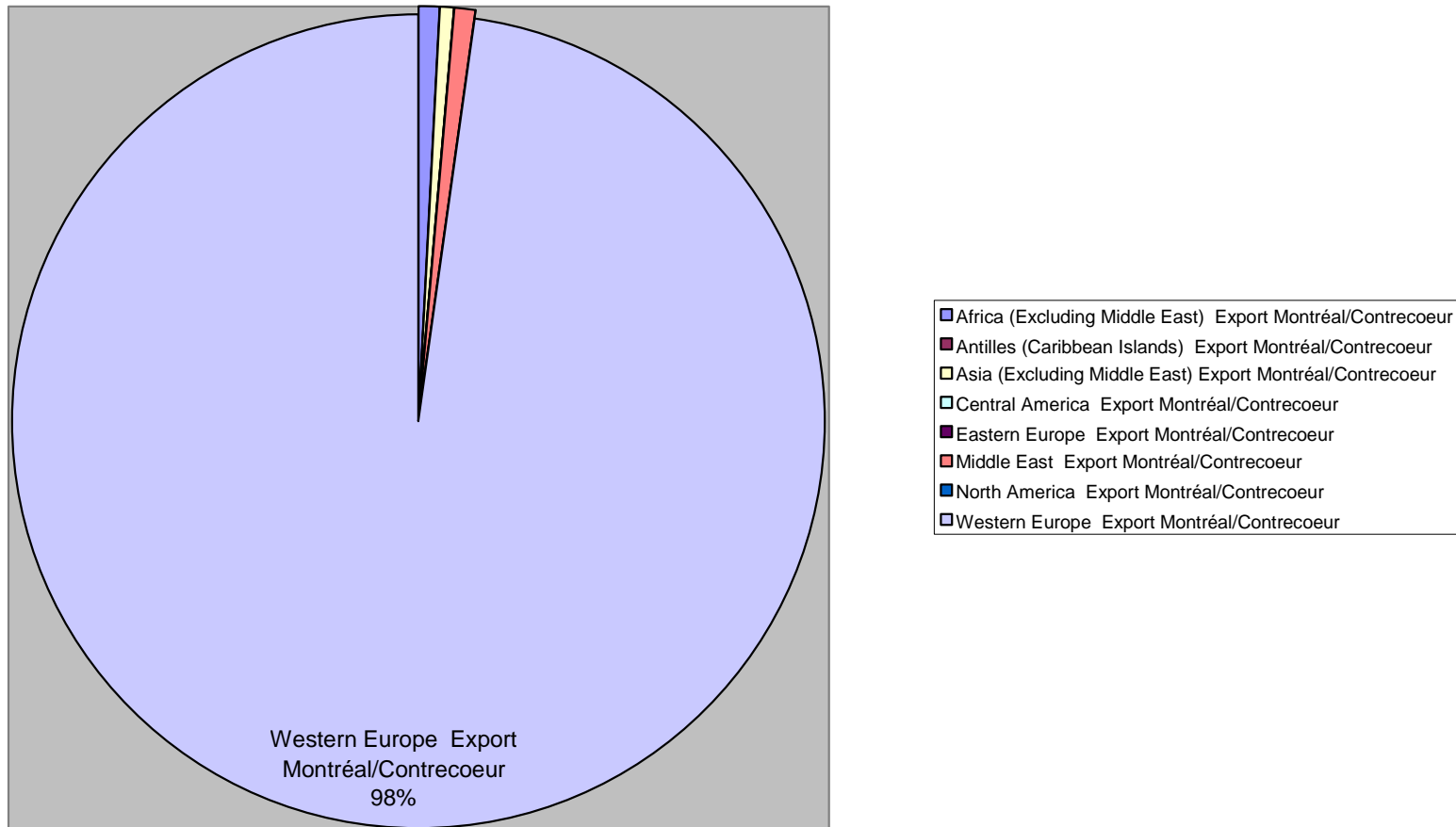
2003 Halifax - Containerized Imports by Trade Route; Tonnes



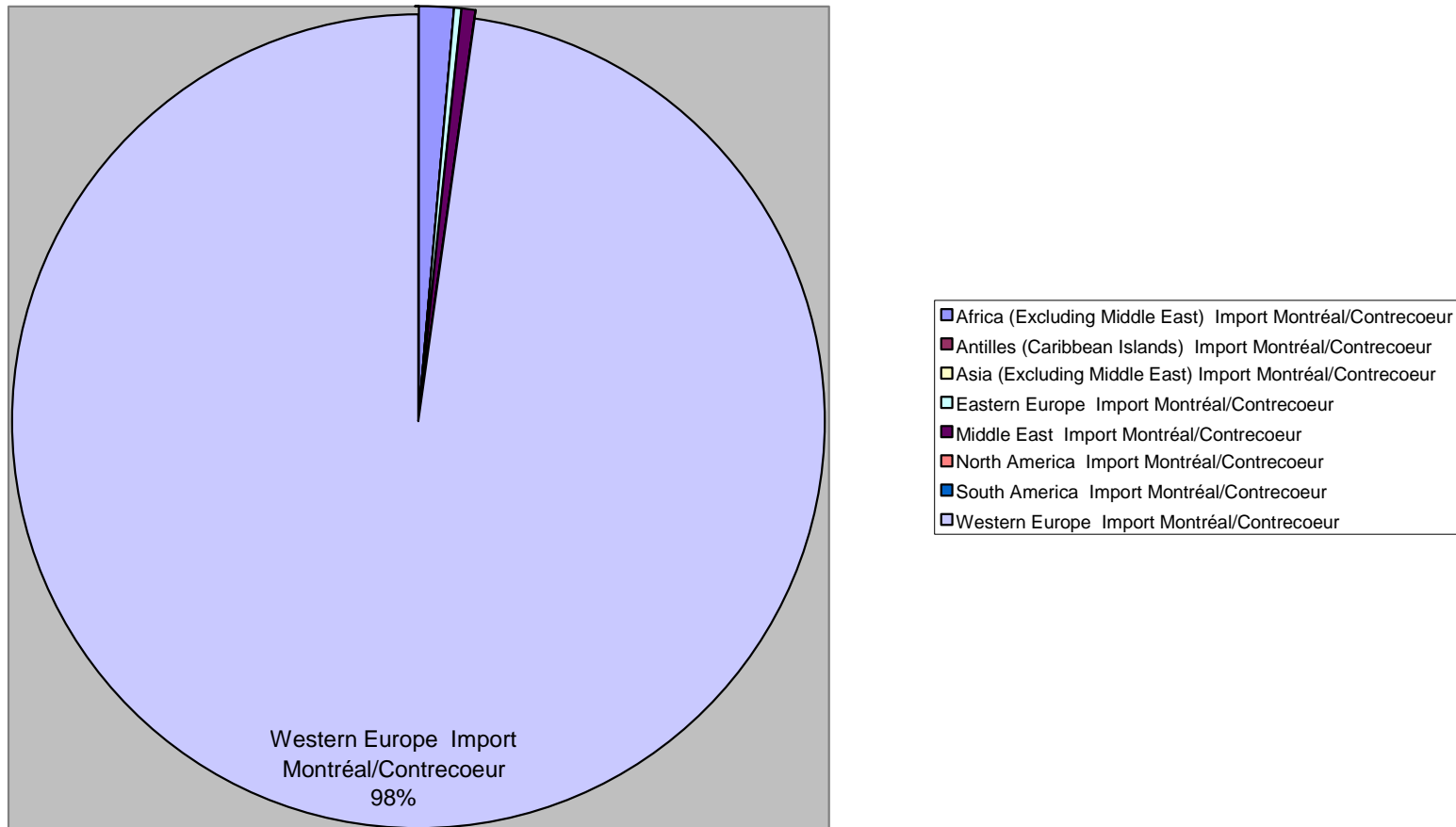
2003 Montreal - Containerized Imports and Exports by Trade Route; Tonnes



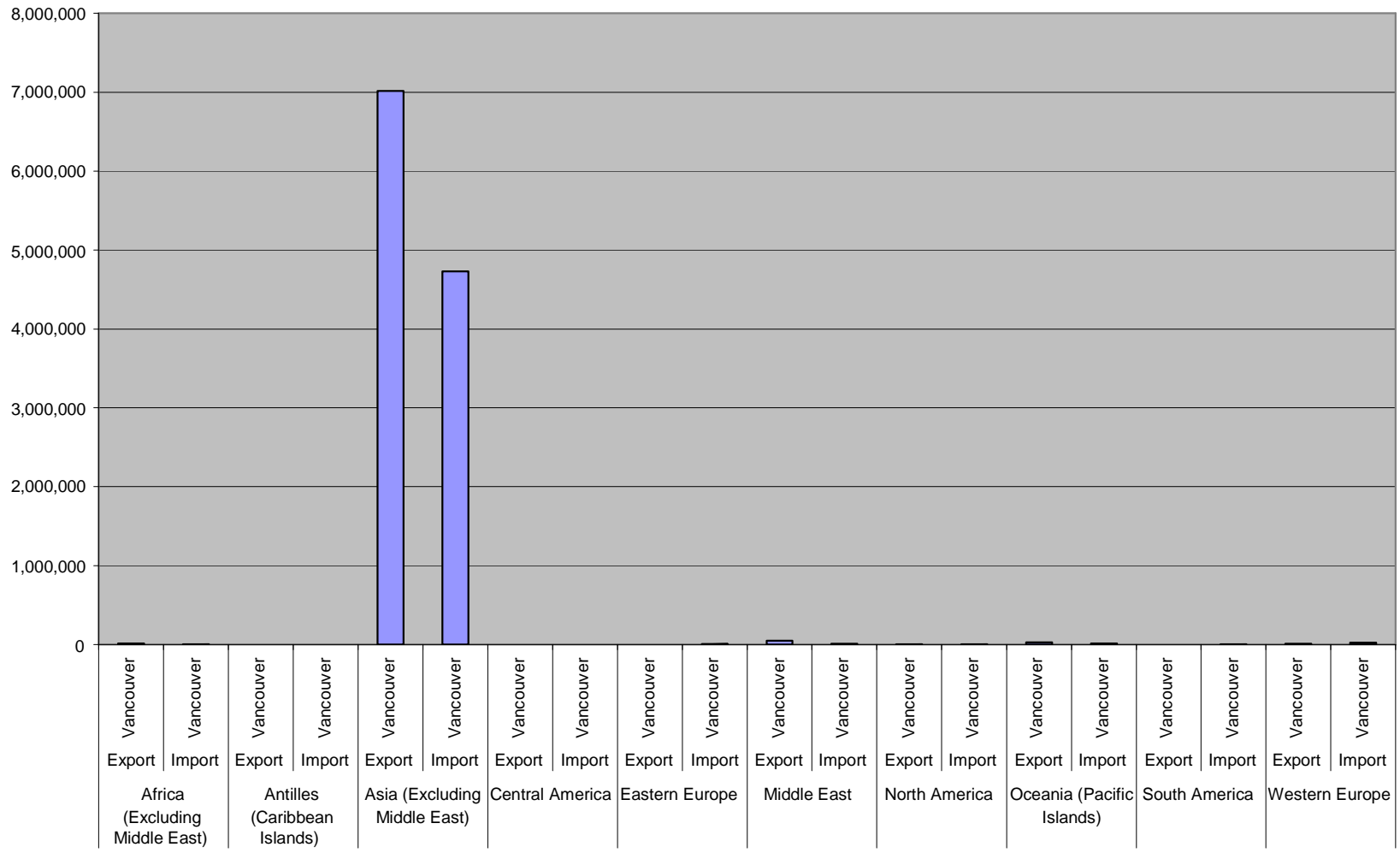
2003 Montreal - Containerized Exports by Trade Route; Tonnes



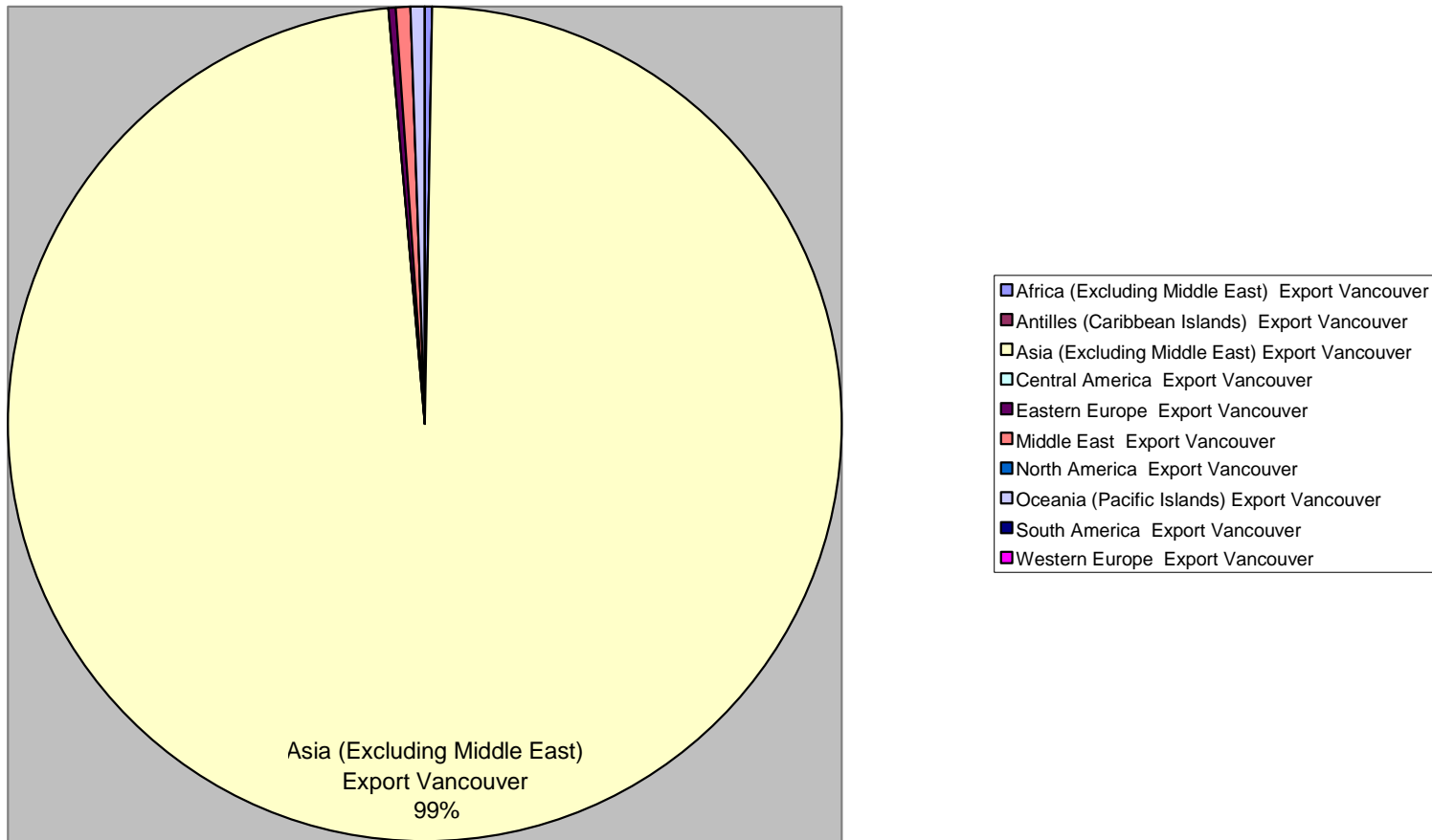
2003 Montreal - Containerized Imports by Trade Route; Tonnes



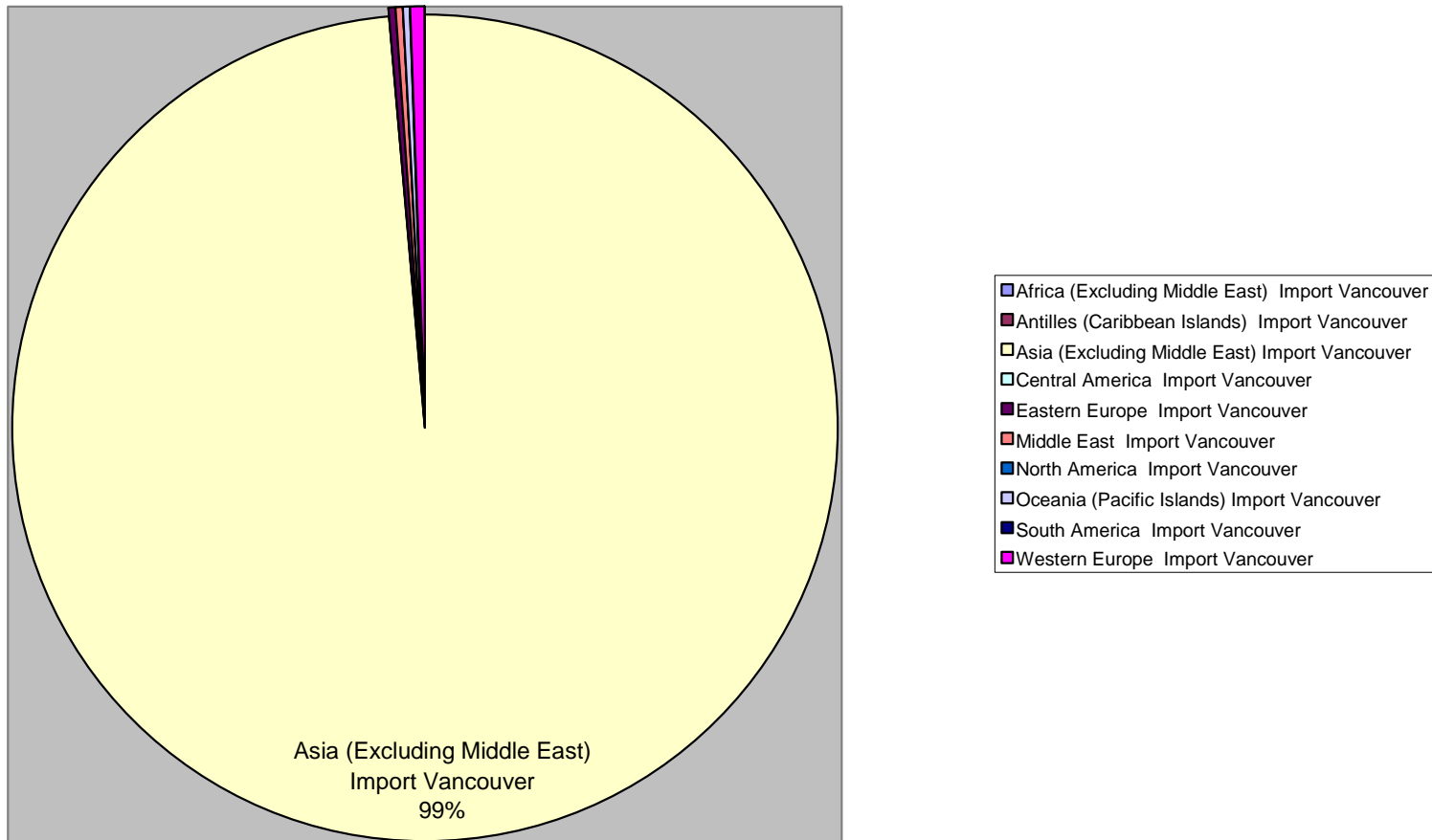
2003 Vancouver - Containerized Imports and Exports by Trade Route; Tonnes



2003 Vancouver - Containerized Exports by Trade Route; Tonnes



2003 Vancouver - Containerized Imports by Trade Route; Tonnes



HALIFAX - Charts Based on: 2000-2003 PORT TRAFFIC.XLS**Halifax Total Tonnes, 2000 to 2003**

Handling port name	Region	2000	2001	2002	2003
Halifax	<i>Region Not Specified</i>	167	357	3,030	4,494
	Africa (Excluding Middle East)	455,529	512,127	684,336	348,293
	Antilles (Caribbean Islands)	228,781	462,027	276,588	547,498
	Asia (Excluding Middle East)	1,083,939	985,504	1,100,267	1,307,406
	Central America	45,287	104,646	86,969	88,531
	Eastern Europe	46,286	61,211	53,324	148,732
	Middle East	361,149	326,411	225,451	309,021
	North America	4,796,810	4,464,669	4,338,068	6,048,363
	Oceania (Pacific Islands)	19,748	4,796	2,683	10,320
	South America	866,780	1,291,914	942,081	319,897
	U.S. Other	28,848	31,170	37,816	21,842
	Western Europe	4,063,966	3,926,198	3,654,296	3,542,930
Halifax Total		11,997,291	12,171,031	11,404,909	12,697,327

Halifax Containerised Tonnes, 2000 to 2003

Handling port name	Region	2000	2001	2002	2003
Halifax	<i>Region Not Specified</i>	167	357	3,030	4,494
	Africa (Excluding Middle East)	74,541	65,948	22,584	20,563
	Antilles (Caribbean Islands)	173,851	224,583	216,713	254,068
	Asia (Excluding Middle East)	989,918	944,686	1,059,408	1,262,463
	Central America	45,261	62,891	86,969	88,527
	Eastern Europe	35,684	36,792	29,318	49,523
	Middle East	331,110	313,009	216,844	304,893
	North America	316,003	360,479	391,266	325,126
	Oceania (Pacific Islands)	17,043	4,796	2,683	9,406
	South America	61,652	77,657	63,843	103,773
	U.S. Other	9,048	10,829	18,916	21,842
	Western Europe	2,218,830	2,146,358	2,042,275	1,972,100
Halifax Total		4,273,107	4,248,383	4,153,849	4,416,776

MONTREAL - Charts Based on: 2000-2003 PORT TRAFFIC.XLS**Montréal/Contrecoeur Total Tonnes, 2000 to 2003**

Handling port name	Region	2000	2001	2002	2003
Montréal/ Contrecoeur	<i>Region Not Specified</i>		41	42	231
	Africa (Excluding Middle East)	1,053,256	753,471	669,123	652,751
	Antilles (Caribbean Islands)	376,099	1,089,099	952,590	540,137
	Asia (Excluding Middle East)	232,288	132,732	113,945	147,597
	Central America	73,647	24,575	101,440	117,563
	Eastern Europe	340,710	179,188	88,638	264,397
	Middle East	376,468	483,806	179,118	172,309
	North America	5,522,675	4,346,168	3,764,908	4,904,383
	Oceania (Pacific Islands)	136,882	362,801	201,085	215,738
	South America	771,495	754,987	1,004,544	940,772
	U.S. Other	55,664	38,852		6,545
	Western Europe	9,797,952	9,749,046	10,170,952	11,001,771
Montréal / Contrecoeur Total		18,737,137	17,914,765	17,246,385	18,964,193

Montréal/Contrecoeur Containerised Tonnes, 2000 to 2003

Handling port name	Region	2000	2001	2002	2003
Montréal/ Contrecoeur	<i>Region Not Specified</i>		41	42	231
	Africa (Excluding Middle East)	117,011	113,423	136,473	96,788
	Antilles (Caribbean Islands)	37,418	41,394	23,665	8,274
	Asia (Excluding Middle East)	23,152	51,090	52,903	23,355
	Central America	19	98	78	10
	Eastern Europe	10,682	12,917	20,600	12,423
	Middle East	184,287	171,852	150,132	60,150
	North America	1,453	2,647	2,224	3,839
	Oceania (Pacific Islands)	17			
	South America	717	12	261	2,663
	Western Europe	8,501,036	8,006,412	8,714,140	9,171,099
Montréal / Contrecoeur Total		8,875,793	8,399,884	9,100,518	9,378,830

VANCOUVER - Charts Based on: 2000-2003 PORT TRAFFIC.XLS

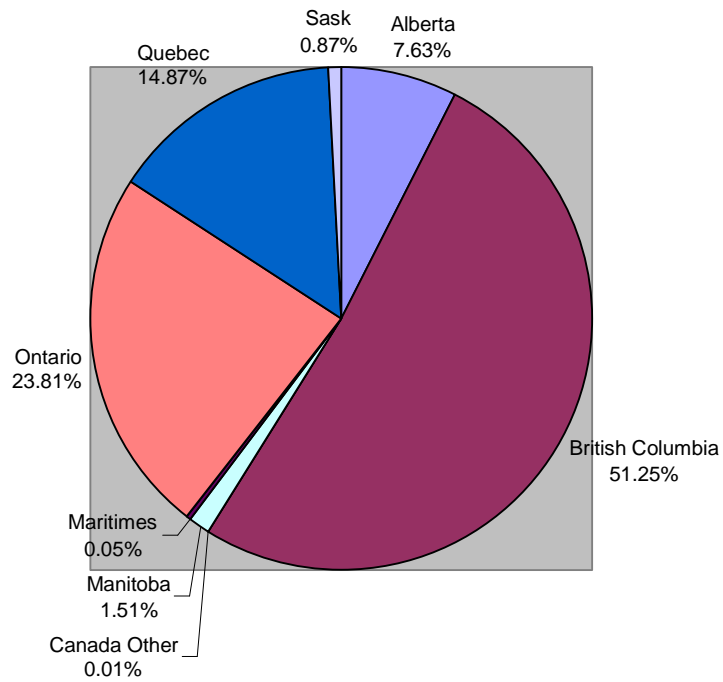
Vancouver Total Tonnes, 2000 to 2003

Handling port name	Region	2000	2001	2002	2003
Vancouver	<i>Region Not Specified</i>	100	229	243	220
	Africa (Excluding Middle East)	1,487,528	885,210	632,198	873,602
	Antilles (Caribbean Islands)	315,529	270,934	285,171	213,447
	Asia (Excluding Middle East)	45,591,822	44,450,087	39,400,159	41,230,091
	Central America	738,953	667,226	559,256	392,382
	Eastern Europe	357,945	111,713	7,366	110,914
	Middle East	4,101,314	2,829,865	1,884,106	2,359,695
	North America	6,641,948	6,404,069	7,375,774	7,403,268
	Oceania (Pacific Islands)	1,466,240	1,449,283	1,508,030	1,262,911
	South America	5,867,788	5,780,714	3,991,408	5,625,741
	U.S. Other	30,860	26,308	23,184	1,935
	Western Europe	7,214,794	7,904,011	6,183,948	6,870,715
Vancouver Total		73,814,820	70,779,649	61,850,843	66,344,923

Vancouver Containerised Tonnes, 2000 to 2003

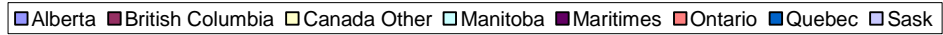
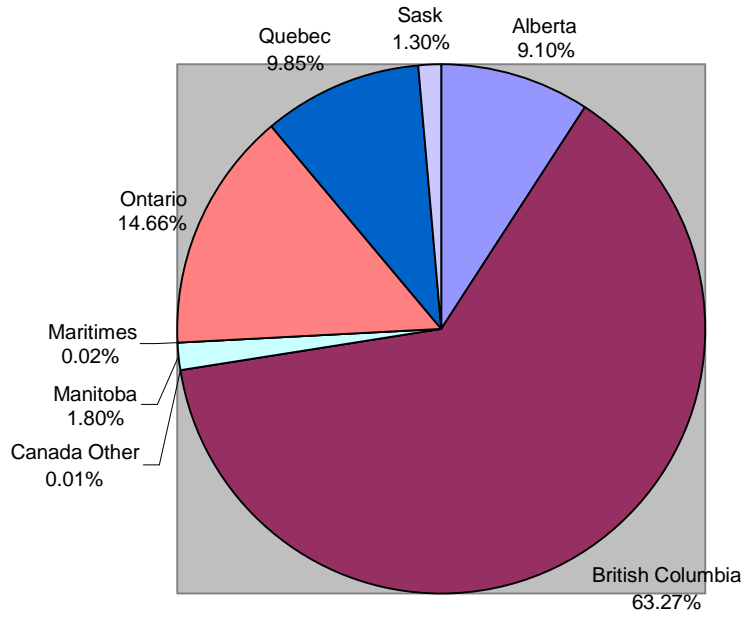
Handling port name	Region	2000	2001	2002	2003
Vancouver	<i>Region Not Specified</i>	100	229	243	220
	Africa (Excluding Middle East)	11,273	11,601	13,436	15,950
	Antilles (Caribbean Islands)	1,954	434	1,166	242
	Asia (Excluding Middle East)	9,443,116	9,524,686	10,915,538	11,744,172
	Central America	19,886	15,103	2,157	158
	Eastern Europe	2,643	3,676	3,707	8,806
	Middle East	48,816	64,543	52,380	58,311
	North America	26,703	23,311	7,728	6,358
	Oceania (Pacific Islands)	36,425	49,305	49,544	42,560
	South America	297,104	271,255	127,245	3,376
	Western Europe	103,265	121,367	86,976	33,903
Vancouver Total		9,991,285	10,085,510	11,260,119	11,914,057

Port of Vancouver, 2005 Tonnes of Imports and Exports, by Province of 'All Directions', All Commodities

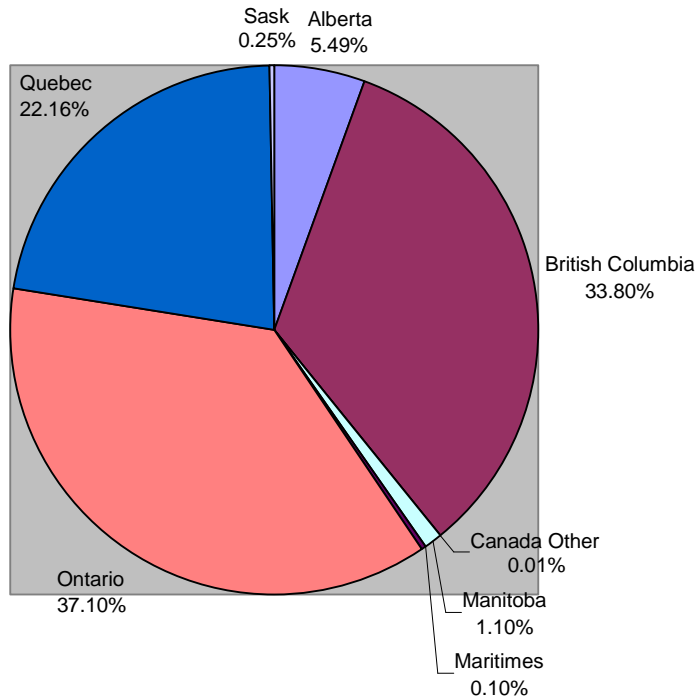


■ Alberta ■ British Columbia □ Canada Other □ Manitoba ■ Maritimes ■ Ontario ■ Quebec □ Sask

Port of Vancouver, 2005 Tonnes of Exports, by Province of Origin, All Commodities

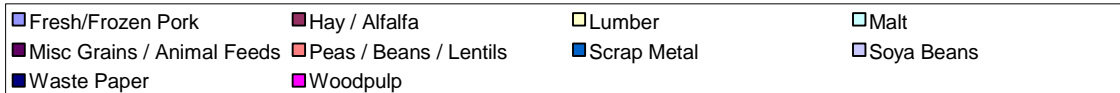
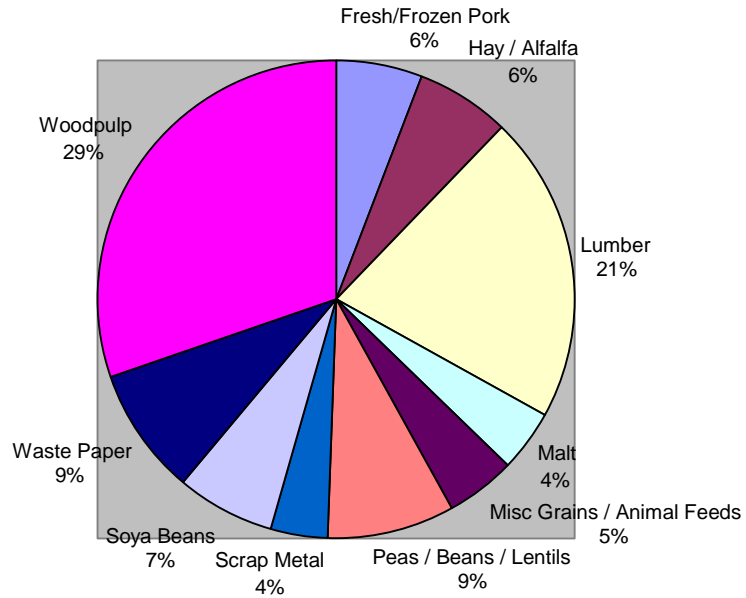


Port of Vancouver, 2005 Tonnes of Imports, by Province of Destination, All Commodities

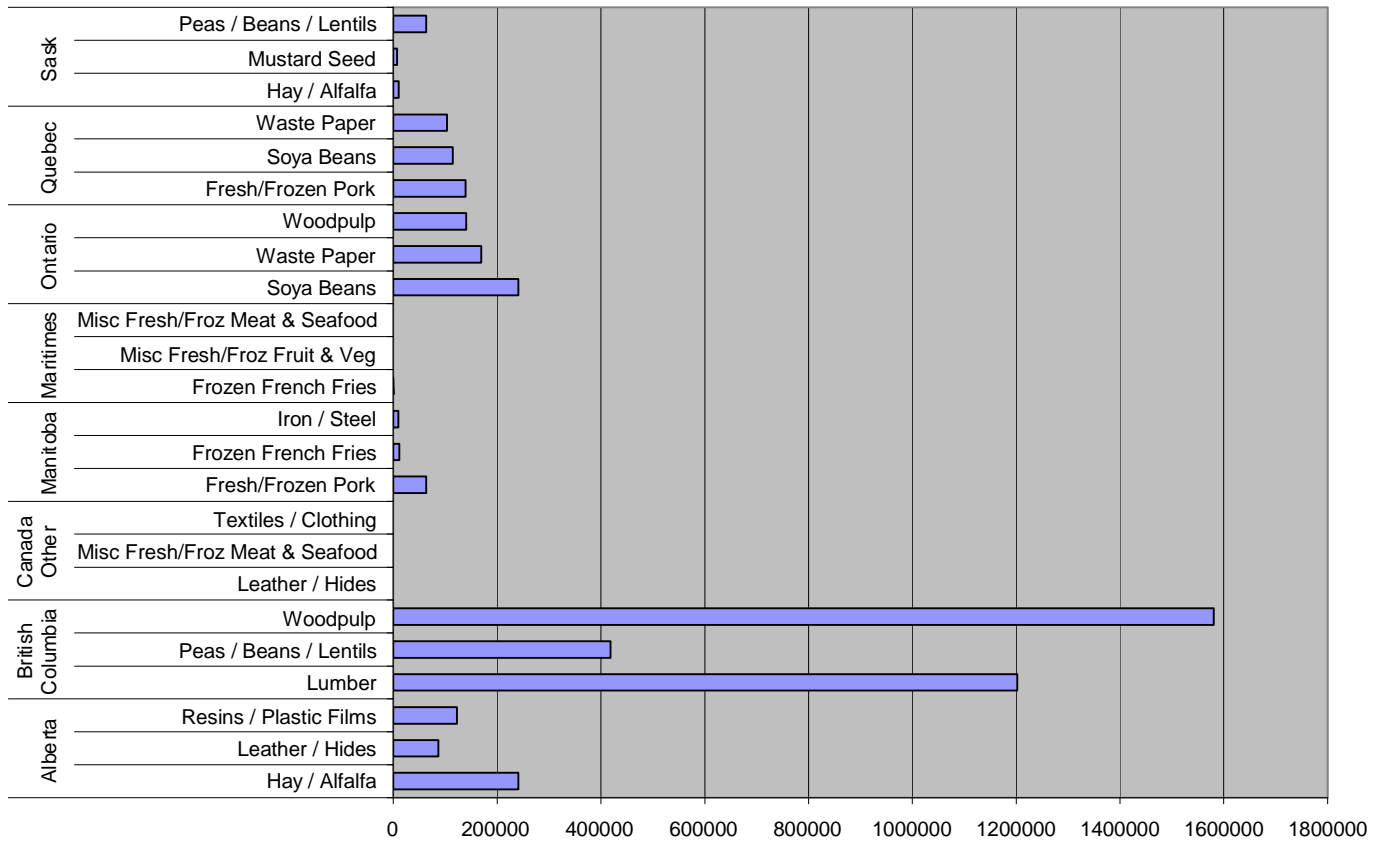


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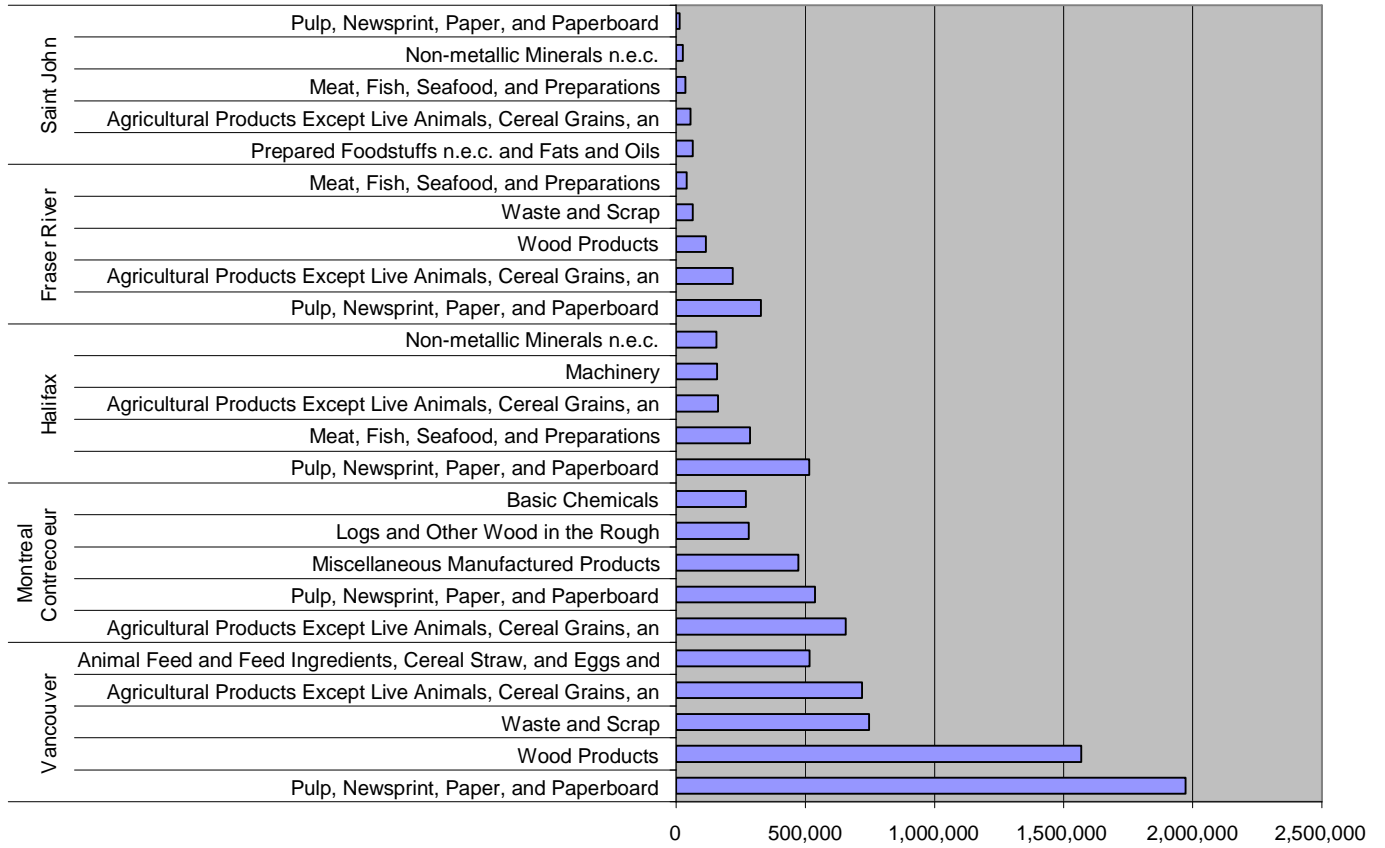
Port of Vancouver, 2005 Tonnes of Exports, Top 10 Commodities



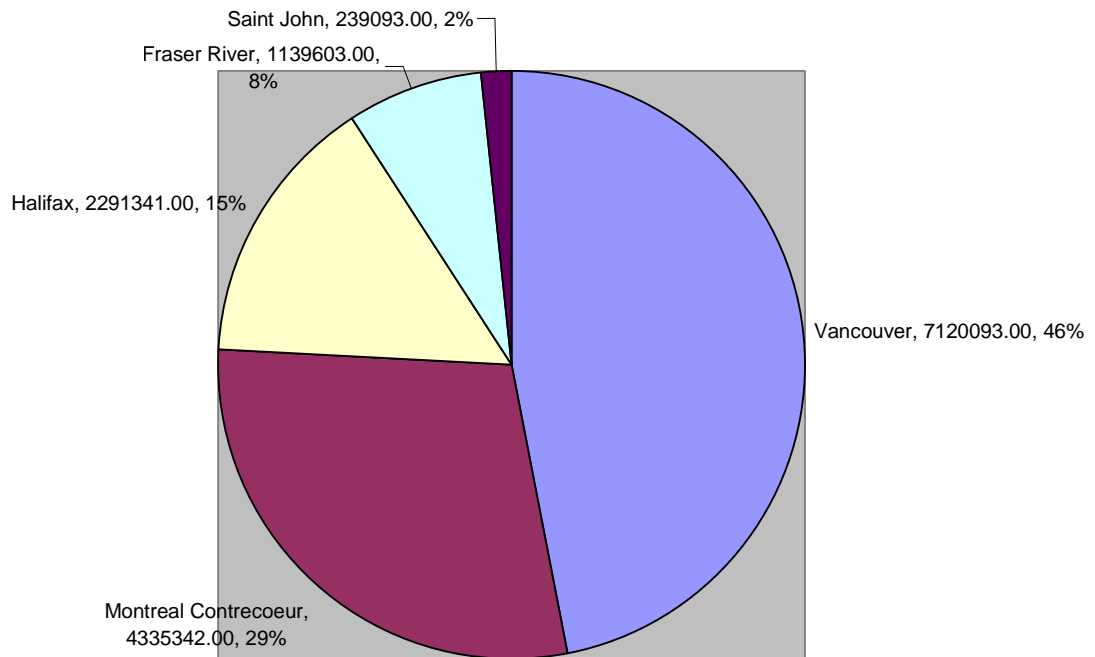
Port of Vancouver, 2005 Tonnes of Exports, Top 3 Commodities by Province of Origin



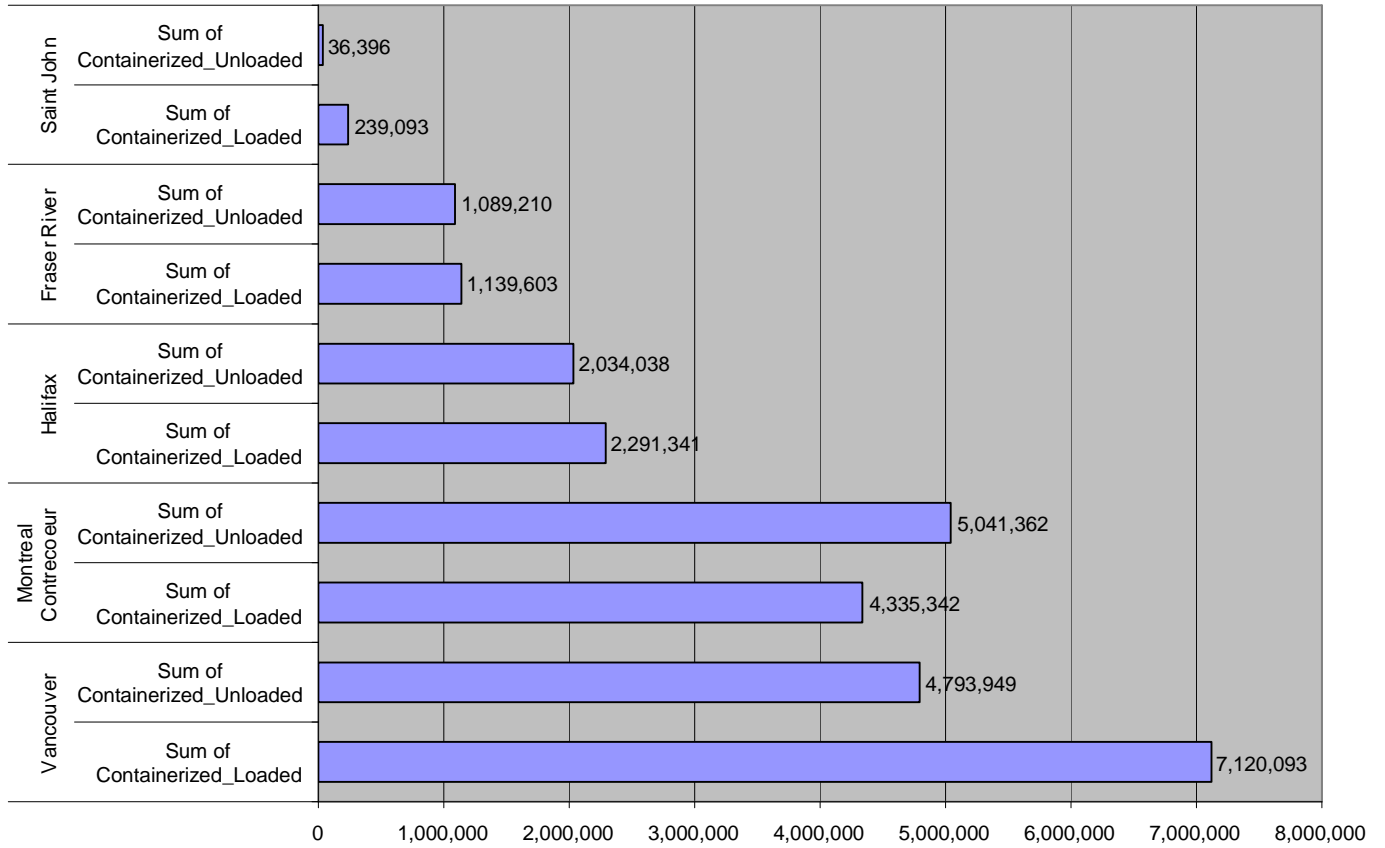
Containers Loaded, Top Five Commodities by Tonnes, Top Five Ports, 2003



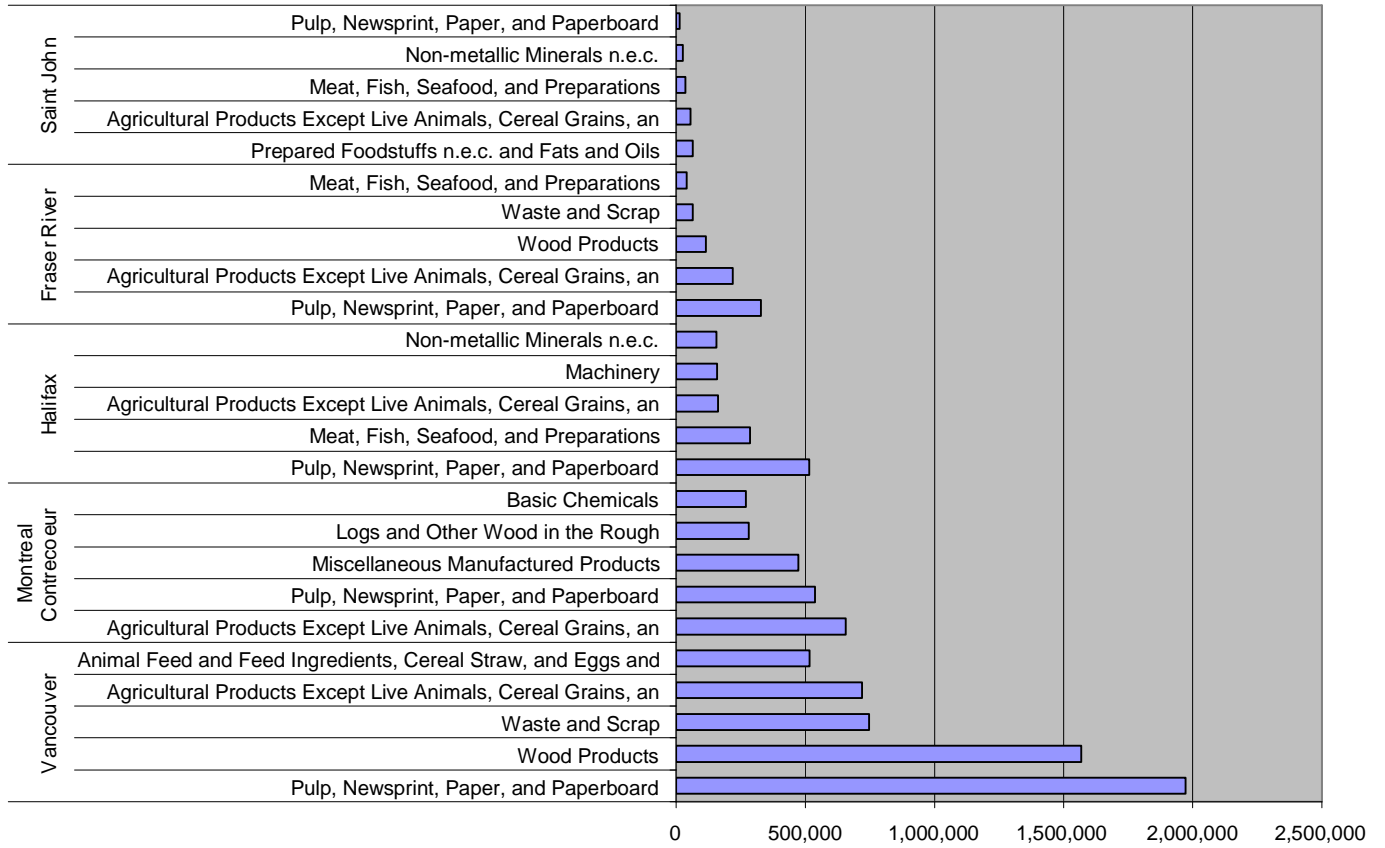
Tonnes of Containers Loaded, Top Five Ports, 2003



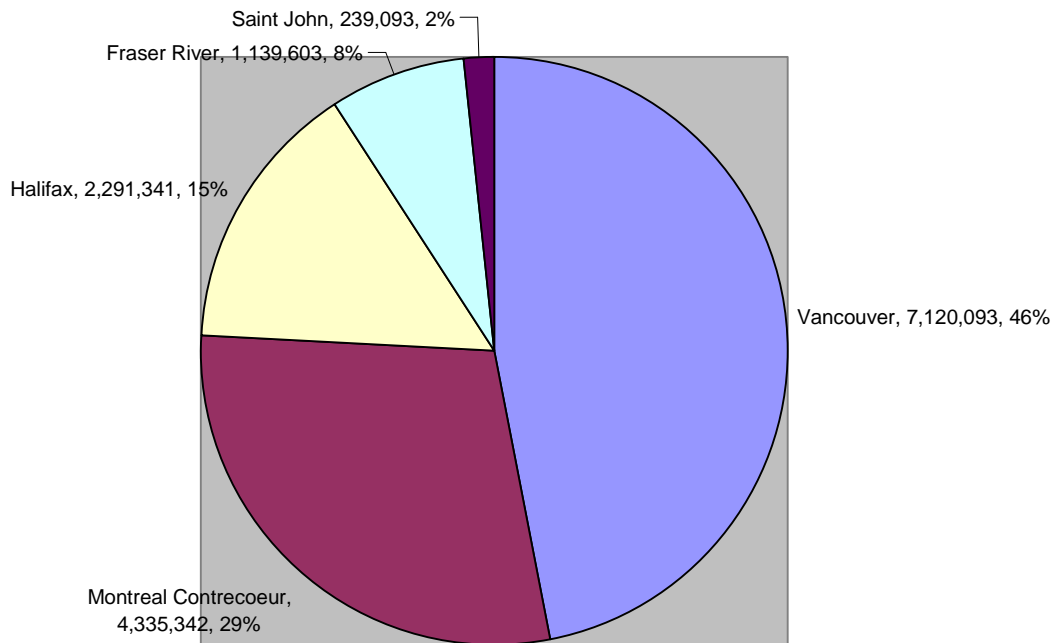
Tonnes of Containers Loaded and Unloaded, Top Five Ports, 2003



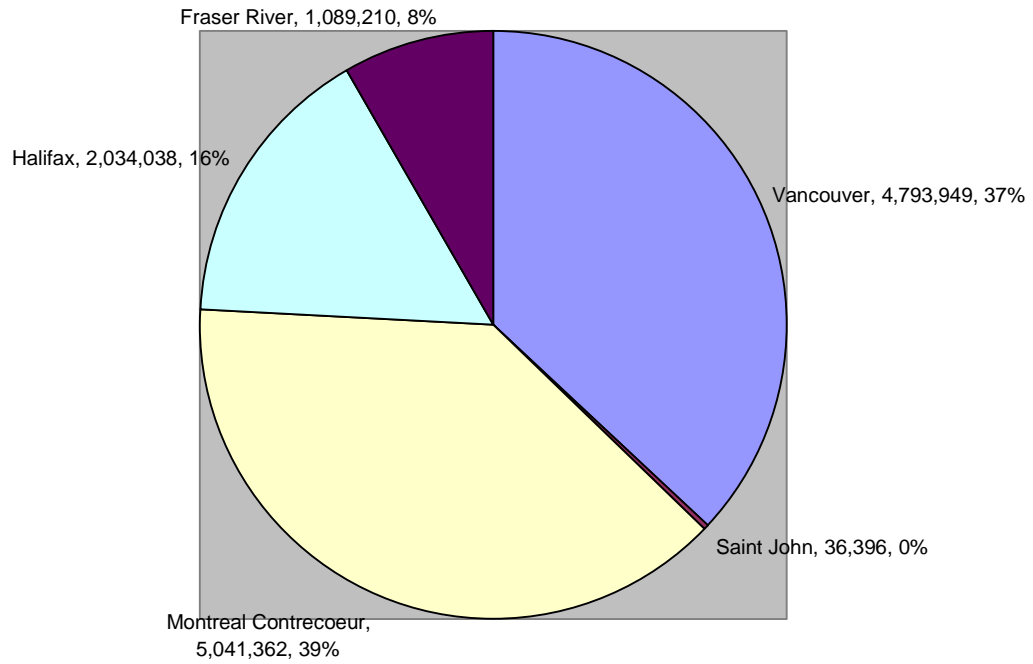
Containers Loaded, Top Five Commodities by Tonnes, Top Five Ports, 2003



Tonnes of Containers Loaded, Top Five Ports, 2003



Tonnes of Containers Unloaded, Top Five Ports, 2003



Tonnes of Containers Loaded and Unloaded, Top Five Ports, 2003

