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EBTC Study of Rail Freight Crossing the Canada-U.S. Border

final

report

prepared for

Eastern Border Transportation Coalition

prepared by

Cambridge Systematics, Inc.

November 2004

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Table of Contents

List of Tables

List of Figures

List of Figures
(continued)

Executive Summary

ES.1 Introduction

The United States and Canada are each others' largest trading partners, swapping goods valued at approximately $392 billion in 2003.[1] Despite the fact that total trade between the two Countries decreased slightly between 2001 and 2002, due primarily to the residual effects of the 9/11 attacks and the recent economic slump, overall trade has since rebounded to pre-9/11 levels. Between 2002 and 2003, the level of trade has grown nearly six percent, and is expected to continue growing over the next several decades.[2]

The Eastern Border Transportation Coalition[3] (EBTC) has played an important role in enhancing the understanding of cross-border freight flows by facilitating communication and cooperation among state, provincial, and metropolitan member agencies, and also through specific efforts, such as the Truck Freight Crossing the Canada-U.S. Border study, completed in 2002. While that study allowed EBTC members to better understand the trade and travel patterns of cross-border truck traffic, it did not provide a comprehensive picture of all surface freight movements between the United States and Canada. A significant amount of cross-border trade occurs by rail, with the value of rail traffic traveling between the United States and Canada having grown by over 17 percent since 1995.[4]

In order to develop a more comprehensive understanding of land trade between the United States and Canada, the EBTC undertook this *Study of Rail Freight Crossing the Canada-U.S. Border*. The objective of the study was to summarize the existing cross-border rail flows originating, terminating, or crossing the Canada-U.S. border within the EBTC region and describe how those movements may change in the future. The results of this study are a critical first step in understanding the volume of freight crossing the Canada-U.S. border by rail and understanding the impacts of those movements on the EBTC region's transportation system and economic competitiveness.

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[1] U.S. Census Foreign Trade Statistics, 2003.

[2] Ibid.

[3] Members of the EBTC include State and Provincial transportation agencies of Maine, Michigan, New Brunswick, Newfoundland, and Labrador, New York, Nova Scotia, Ontario, Prince Edward Island, Quebec, and Vermont; the Metropolitan Planning Organizations of the Buffalo and Detroit areas; and the Regional Municipality of Niagara.

[4] U.S. Bureau of Transportation Statistics, 2003.

ES.2 Commodity Flow Data and Forecasts

Several public and privately maintained commodity flow datasets, including data available from the U.S. Bureau of Transportation Statistics, the Surface Transportation Board, and Statistics Canada, were evaluated to assess their appropriateness for use in this study. Because it provided the right mix of commodity and geographic detail, a TRANSEARCH database describing cross-border rail flows affecting the EBTC region was purchased by the EBTC from Reebie Associates. The dataset selected contained approximately 42,000 records which described:

- **Origin and destination of cross-border rail flows** by U.S. county and Canadian province;
- **Commodity information** using two-digit Standard Transportation Classification Codes (STCC);
- **Crossing detail**, which described the specific point at which the rail freight crossed the Canada-U.S. border; and
- **Commodity value**, in U.S. dollars.

A forecast of cross-border rail freight movements was developed in order to gain an understanding of how the growth of existing cross-border rail flows may impact the EBTC region's transportation infrastructure and economic vitality. Changes in economic and industry characteristics, which are closely related to changes in commodity flow patterns, were quantified and used to predict changes in cross-border rail movements. Historical employment, gross domestic product (GDP), and trade patterns were evaluated against the cross-border rail forecast developed as part of FHWA's Freight Analysis Framework (FAF) project.

Table ES.1 shows the result of this analysis. Because the FAF forecast was developed prior to the events of 9/11 and the 2002/2003 economic downturn, the growth rate projected by the FAF was selected as the upper-bound for future cross-border rail movements. Since trade between the United States and Canada grew at a compound annual growth rate of 1.23 percent between 1998 and 2003, a period of economic downturn, this value was selected as the lower bounds of future growth. In all likelihood, future growth will occur somewhere between the two values used, as shown in Figure ES.1.

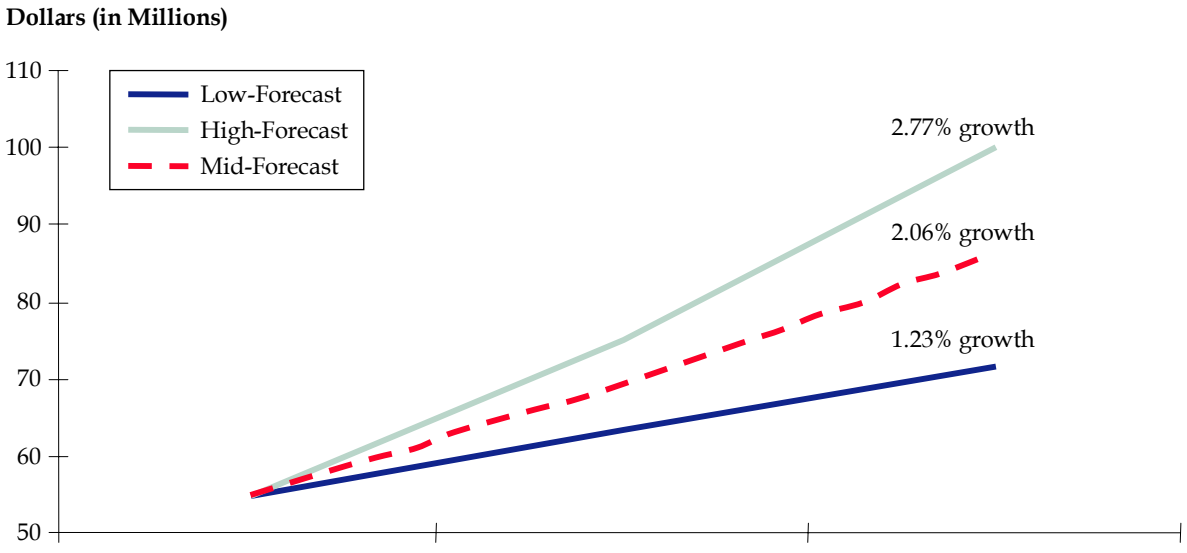
Table ES.1 Comparison of U.S. and Canada Growth Statistics with FAF Forecast Growth Rate

Source	1998-2003	1998-2020
U.S. Employment	0.63%	-
Canadian Employment	2.17%	-
Real GDP Growth in the United States	2.75%	-
Real GDP Growth in Canada	3.53%	-
Real Growth in Value for Canadian-U.S. Trade	1.23%	-
FAF: Flow of Goods from Canada to the United States	-	2.86%
FAF: Flow of Goods from the United States to Canada	-	2.49%

Sources: Bureau of Labor Statistics, U.S. Census Bureau, Statistics Canada.

Figure ES.1 Comparison of Forecasts of Projected Growth of Combined Rail Trade between the United States and Canada

U.S. Dollars



ES.3 Key Findings

Key findings are provided in two areas:

1. **Cross-border rail movements**, which reflect the analyses of the base year and forecast cross-border freight rail flow data; and
2. **Cross-border rail data, forecasting, and mapping**, which address the ability of existing cross-border rail data to support forecasting, mapping, and other transportation planning activities conducted by states, provinces, metropolitan planning organizations, and other transportation planning organizations.

Cross-Border Rail Movements

There are several key findings of the analysis of existing cross-border rail flows originating, terminating, or crossing the northern border within the EBTC region, including:

- **Cross-border rail freight movements in the EBTC region are significant**. As shown in Table ES.2, approximately 54.8 million tons of rail freight originated, terminated, or crossed the border within the EBTC region. Conservative forecasts developed as part of this project indicate that over 71.7 million tons of rail freight is projected to cross the entire U.S.–Canada border in 2020, an increase of approximately 31 percent. Clearly, cross-border movements by rail are and will continue to be an important component of the transportation system and economic vitality of both the United States and Canada. It is important that cross-border rail movements and issues not be overlooked by the EBTC region's transportation planning agencies when they conduct transportation planning activities.

Table ES.2 Existing and Forecast Cross-Border Rail Flows within the EBTC Region

	2001		2020	
	Weight (Tons)	Value (Millions of U.S. Dollars)	Weight (Tons)	Value (Millions of U.S. Dollars)
United States-Canada	14,326,000	$16,700	18,740,000	$28,900
Canada-United States	40,508,000	$54,700	53,005,000	$64,600
Total	**54,834,000**	**$71,400**	**71,755,000**	**$93,500**

- **A significant percentage of cross-border rail flows occur between the three Michigan and Ontario border crossings.** Over 70 percent of the weight of cross-border rail trips in the region enter Canada through Ontario, while almost 48 percent enter the U.S. through Michigan, as shown in Table ES.3. Entrance of goods into Canada through Ontario accounts for almost 65 percent of the value of regional rail freight movements, while Michigan serves as the gateway to almost 67 percent of the total value of regional rail freight entering the U.S., as shown in Table ES.4. Clearly, the efficiency of these crossings is of key importance to the EBTC region and to the U.S. and Canada as a whole.

Table ES.3 Weight of Rail Freight at EBTC Border Crossings

2001 (tons)

U.S. to Canada Rail Freight								Canada to U.S. Rail Freight				
Two Way	%	One Way	%	Prov.	Major Crossing	Rail Freight	%	State	%	One Way	%	Two Way
40,716,916	77.7%	8,407,923	70.1%	ON	International Falls Bridge	8,580,681	16.4%	MN	21.0%	8,508,728	16.4%	8,580,681
					Sault Ste. Marie Bridge	3,741,906	7.1%	MI	47.8%	19,337,443	47.9%	25,110,296
					St. Clair River Tunnel	10,855,251	20.7%					
					Windsor-Detroit Tunnel	10,513,139	20.0%					
7,387,538	14.1%	2,863,355	23.9%	QC	Niagara-Buffalo	7,025,939	13.4%	NY	21.6%	8,734,720	25.8%	13,507,339
					Ft. Covington-Trout River	2,707,935	5.2%					
					Champlain-Rouses Point	3,773,465	7.2%					
					Alburg	82,473	0.2%	VT	0.3%	126,566	0.5%	248,200
					Derby Line	33,337	0.1%					
					Norton	132,390	0.3%					
4,330,186	8.3%	720,750	6.0%	NB	Lowellton	657,938	1.3%	ME	9.2%	3,735,155	9.5%	4,988,124
					Van Buren	702,933	1.3%					
					Vanceboro	3,069,715	5.9%					
					Calais	557,538	1.1%					
52,434,640	100%	11,992,028	100%			52,434,640	100%		100%	40,442,612	100%	52,434,640

Table ES.4 Value of Rail Freight at EBTC Border Crossings

2001 (Millions, U.S. Dollars)

U.S. to Canada Rail Freight								Canada to U.S. Rail Freight				
Two Way	%	One Way	%	Prov.	Major Crossing	Rail Freight	%	State	%	One Way	%	Two Way
56,176	83.2%	8,485	64.8%	ON	International Falls Bridge	6,079	9.0%	MN	10.6%	5,767	9.0%	6,079
					Sault Ste. Marie Bridge	2,076	3.1%					
					St. Clair River Tunnel	18,452	27.3%	MI	66.7%	36,264	60.6%	40,899
					Windsor-Detroit Tunnel	20,372	30.2%					
6,730	10.0%	3,102	23.7%	QC	Niagara-Buffalo	9,198	13.6%	NY	16.7%	9,092	22.1%	14,937
					Ft. Covington-Trout River	2,176	3.2%					
					Champlain-Rouses Point	3,563	5.3%					
					Alburg	406	0.6%	VT	0.2%	95	0.8%	536
					Derby Line	36	0.1%					
					Norton	94	0.1%					
4,576	6.8%	1,498	11.5%	NB	Lowellton	456	0.7%	ME	5.8%	3,179	7.5%	5,032
					Van Buren	422	0.6%					
					Vanceboro	2,753	4.1%					
					Calais	1,400	2.1%					
67,482	100%	13,085	100%			67,482	100%		100%	54,397	100%	67,482

Source: EBTC TRANSEARCH database.

NB: Tables ES.3 and ES.4 present the volume of freight that passes through each of the major EBTC rail crossings. As discussed in this report, much of this freight originates or terminates in locations outside of the EBTC region. Cross-border rail freight that passes through "unknown gateways" (described in Section 2.2) is not included in this summary.

- **Non-border states are the origins or destinations of a significant percentage of cross-border rail trade**. Over 80 percent of both the weight and value of cross-border rail trips in the region have origins or destinations away from the border. In fact, 17 non-border states account for 66 percent of the weight and 71 percent of the value of United States-bound rail movements; and 52 percent of the weight and 63 percent of the value of Canada-bound rail movements, as shown in Figures ES.2 and ES.3.[5] This detail further emphasizes one of the key findings of the *EBTC Study of Truck Freight Crossing the Canada-U.S. Border*. Namely, cross-border trade and transportation has impacts and benefits to the transportation systems and economic vitality of all states, not just those located along the northern border.

[5] The border states include Maine, Michigan, Minnesota, Vermont, NewYork, and Washington. The next tier states include Illinois, Indiana, Massachusetts, New Jersey, Ohio, Oregon, Pennsylvania, and Wisconsin. The remaining states are classified as interior states.

Figure ES.2 EBTC Cross-Border Rail Trade by Weight

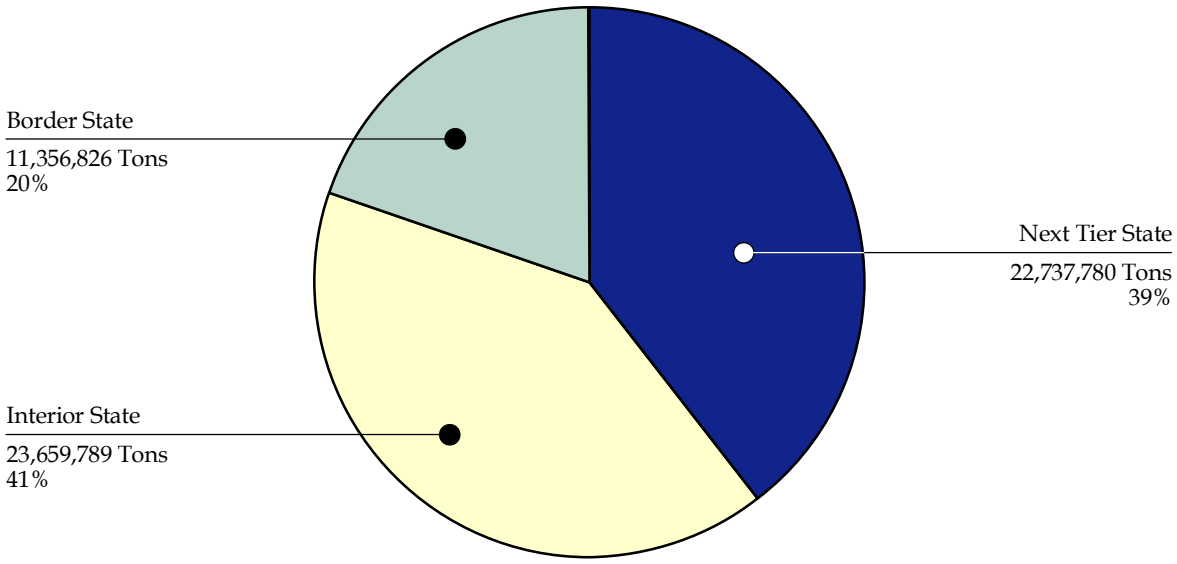
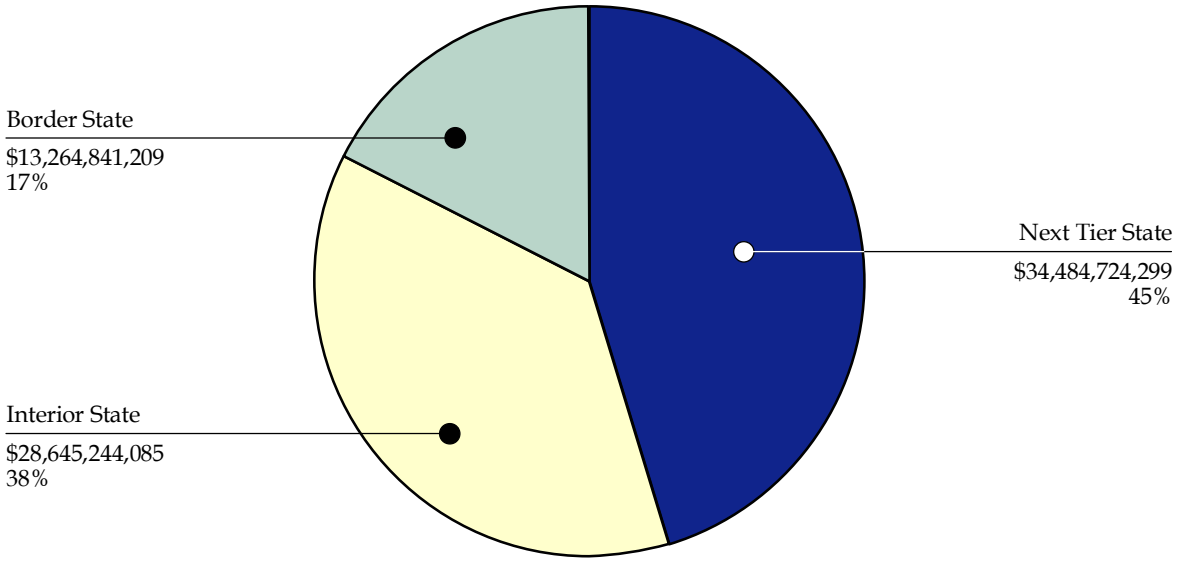


Figure ES.3 EBTC Cross-Border Rail Trade by Value
U.S. Dollars



- **A handful of commodity groups drives cross-border trade**. The top four commodity groups by weight (wood products, textiles, and leather; pharmaceutical and chemical products; stone, minerals, and ores; and electronics, vehicles, and precision goods) accounted for 77 percent of the total flows by weight, or 45.6 million tons in 2001 and are expected to account for 73 percent of the total flows by weight, or 72.7 million tons, in 2020. The top four commodity groups by value (electronics, vehicles, and precision goods; pharmaceutical and chemical products; wood products, textiles, and leather;

and furniture and miscellaneous products) accounted for approximately 87 percent of the total flows by value, or $61.6 billion (U.S. dollars), in 2001 and are expected to account for approximately 83 percent of the total flows by value, or $117.6 billion (U.S. dollars), in 2020. This finding reflects the diversity of the EBTC region's economy, which consists of traditional resource-based industries that produce wood, pulp and paper, and other products; as well as high-value-added manufacturing industries, such as the automotive industry in Michigan and Ontario. Because rail is a key component of the supply and distribution chains of these diverse industries, the region's economic competitiveness relies in part on the ability of the rail system to provide efficient, reliable service.

- **The United States is and will continue to be a net importer of cross-border rail trade from Canada**. Though trade between the United States and Canada currently is balanced in some commodities, including pharmaceutical and chemical products, and stone, minerals, and ores, nearly three-quarters of total EBTC cross-border rail flows currently originate in Canada and are transported to the United States, as shown in Figures ES.4 and ES.5. This imbalance is expected to hold true in 2020, though trade in certain commodities, such as electronics, vehicles, and precision goods, will become more balanced.

Figure ES.4 Total EBTC Trade in Tons

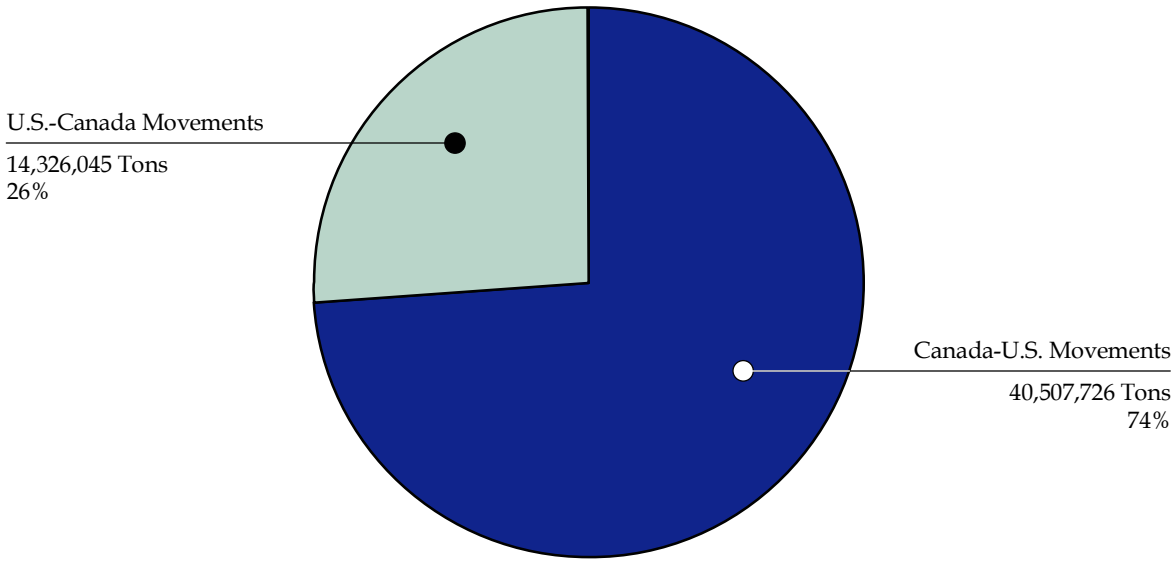
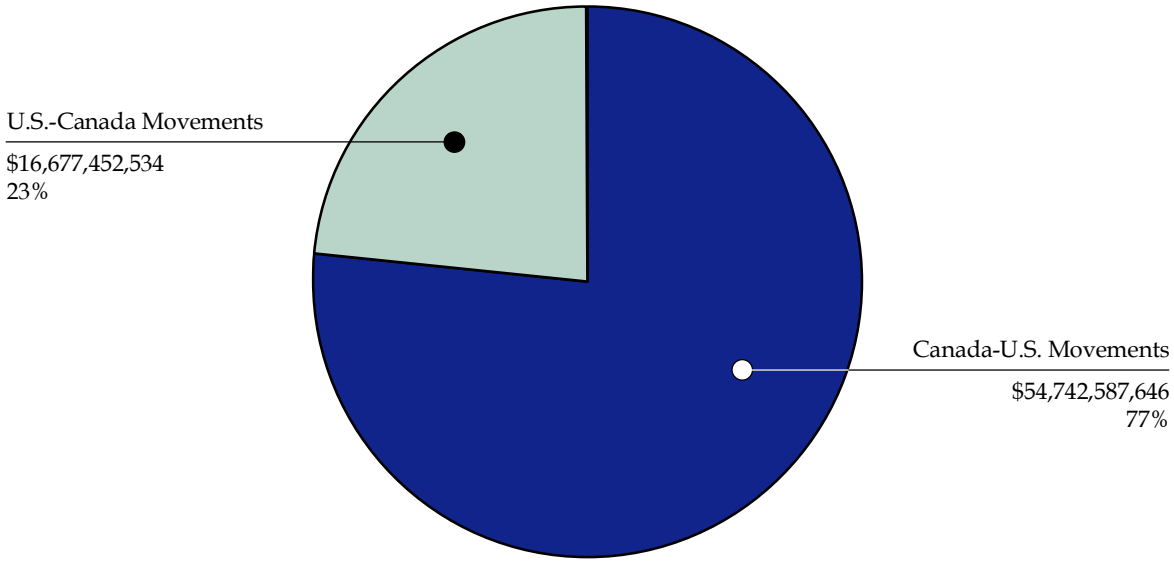


Figure ES.5 Total EBTC Trade by Value
U.S. Dollars



Cross-Border Rail Data, Forecasting, and Mapping

During the course of this study, several key findings that relate to the accuracy and reliability of existing sources of cross-border rail data and the difficulties encountered when attempting to forecast and map these data were identified. These findings may be helpful to the EBTC, its member agencies, and other states and provinces in understanding the limitations of existing cross-border rail datasets. An understanding of the strengths and limitations of these existing data sources is critical when using these data to guide transportation planning activities or to identify and justify transportation investments.

- **There is no single, reliable, comprehensive source of cross-border rail data**. There are several different datasets that can be used to describe cross-border freight rail movements. Cross-border rail information is collected and summarized in many different datasets, including the Bureau of Transportation Statistics (BTS), the Transborder Surface Freight Trade Data (TSFD), Statistics Canada, Reebie Associates, the Surface Transportation Board (STB), and the Federal Highway Administration (FHWA). The sources for these datasets, as well as the information they provide to users, differs significantly. Because each of these datasets provides only a snapshot of information and measures different aspects of cross-border rail movements, it is difficult for any single dataset to completely describe cross-border rail flows and even more difficult to compare the information contained in these datasets against each other to verify cross-border rail flows.

- **The accuracy of cross-border rail data decreases as the level of geographic detail becomes more refined**. In many commodity flow databases, including cross-border

rail data, the accuracy of the data decreases as the geographic regions become smaller. That is, commodity flows between states and provinces are normally more accurate than commodity flows between counties, zip codes, and traffic analysis zones. One reason for this decrease in accuracy is that public entities are often prohibited from publishing data that would disclose the operations of individual firms or establishments. Many publicly available commodity flow databases, for example, aggregate their data for specific regions in such a way as to protect the confidentiality of industry participants. This also is a common practice for publicly available socioeconomic data, such as employment statistics, which are often used in the development of commodity flow databases. For these and other reasons, data describing cross-border rail flows at individual U.S.-Canada gateways often varies widely from dataset to dataset. While these existing cross-border rail datasets are useful in identifying general trends, they often cannot support the needs of states, provinces, and MPOs when conducting more detailed transportation planning activities.

- **There is no single source of cross-border rail forecasts**. Many state and provincial government entities develop their own economic forecasts to guide future policy decisions and there are many private sector sources of economic forecasts that can be used to develop projections of future cross-border rail movements. However, there is no single source of information that can be used to quickly and inexpensively develop reliable forecasts of regional cross-border rail activity. As a result, transportation planners in the EBTC region and elsewhere must evaluate a wide range of factors, including historical trade patterns, general economic and industry growth patterns, and employment trends, and use that information to develop estimates of future rail flows.

- **Modeling and mapping rail flows differs significantly from highway (truck) modeling and mapping efforts**. Railroad operations differ significantly from highway (truck) operations, making it more difficult to model and map rail flows as compared to highway flows. While trucks are often concerned with minimizing cost or travel time between origins and destinations, railroads are often more concerned with maximizing their income for each individual shipment. When a rail shipment occurs on more than one railroad, the revenue from that shipment is divided among the railroad carriers that were involved in the transport. The originating and terminating railroads often receive anywhere from eight percent to 20 percent of the revenue, with the remainder divided among the railroads that handled the shipment in between. In general, the longer a shipment remains on an individual railroad's trackage, the more revenue that railroad can expect to receive.[6] As a result, while a fair representation of highway movements can be estimated using a shortest path algorithm, modeling and mapping rail movements often depends on a deeper understanding of rail operations, interline agreements between individual railroads (which can affect routing), and other factors.

[6] Black, W.R., *Transport Flows in the State of Indiana: Commodity Flow Database Development and Traffic Assignment, Phase 2*.

ES.4 Recommendations

The following recommendations are provided to the EBTC and its member agencies to guide future rail and other planning activities.

- **The EBTC should continue to conduct studies and analyses to broaden the level of understanding of cross-border freight movements and their impact on North American transportation systems and economic vitality.** The EBTC has played an important role in enhancing the understanding of cross-border freight flows by facilitating communication and cooperation among state, provincial, and metropolitan member agencies and also through specific efforts, such as the *Truck Freight Crossing the Canada-U.S. Border* study and this cross-border rail study. The EBTC and its member agencies should continue to conduct these types of cross-border trade and transportation analyses, as they are effective ways to describe the significance of cross-border trade between the United States and Canada and assess the impact of that trade on the North American transportation system and the economic vitality of the United States and Canada.

- **The EBTC should work with Federal agencies in the United States and Canada to develop a more comprehensive freight data collection and dissemination program.** The lessons learned from this *Study of Rail Freight Crossing the Canada-U.S. Border* could be useful to the FHWA and other Federal agencies in the United States and Canada as they attempt to improve the quality, quantity, and reliability of freight data. The EBTC should work closely with these and other agencies to ensure that cross-border freight data needs and issues are adequately addressed as part of these efforts.

- **EBTC member agencies should continue to address freight rail movements – and cross-border freight rail movements, in particular – as part of their own transportation planning and programming activities.** This study and previous efforts of the EBTC have highlighted the impacts of cross-border trade and transportation on statewide, provincial, and metropolitan transportation systems and economic vitality. The EBTC itself, however, has limited ability to implement projects or strategies that can improve the efficiency of cross-border movements. As such, individual member agencies of the EBTC should work to ensure that freight rail movements – and cross-border freight rail movements in particular – are addressed as part of their own transportation planning and programming activities.

- **The EBTC and its member agencies should participate in other existing regional rail studies**. The efficiency of the North American rail system has attracted the attention of many U.S. agencies and there are many examples of recent or ongoing studies that are addressing the ability of the rail system to handle project volumes of freight. As the lessons learned from this *Study of Rail Freight Crossing the Canada-U.S. Border* could be useful in these and other regional planning activities, the EBTC and its member agencies should become involved in these other efforts.

1.0 Introduction

The United States and Canada are each others' largest trading partners, swapping goods valued at approximately $392 billion in 2003.[1] Though total trade between the two countries decreased slightly between 2001 and 2002, due primarily to the residual effects of the 9/11 attacks and recent economic slump, overall trade has since rebounded to pre-9/11 levels, growing nearly six percent between 2002 and 2003, and is expected to continue growing over the next several decades.[2]

States and provinces along the northern border have become increasingly interested in how cross-border freight flows affect their transportation systems and economic competitiveness. The States of Vermont, New York, and Maine, for instance, have built statewide, regional, and other profiles of freight movement and have begun to tie freight policy and transportation investments more closely to state economic development goals. The Atlantic Provinces (Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick), Quebec, and Ontario have also recently completed comprehensive freight studies describing the freight transportation characteristics in their regions.

The Eastern Border Transportation Coalition[3] (EBTC) has played an important role in enhancing the understanding of cross-border freight flows by facilitating communication and cooperation among state, provincial, and metropolitan member agencies and also through specific efforts, such as the *Truck Freight Crossing the Canada-U.S. Border* study, completed in 2002. That study was completed using data from the United States/Canada component of the 1999 National Roadside Survey (NRS) of trucks traveling though Canada. The EBTC funded an expansion of the NRS survey to include additional survey sites at 22 principal border crossing locations. The cross-border truck study had two important outcomes: it provided a more detailed analysis of cross-border truck movements, including summaries of commodity weight and value for states, provinces, and border crossings in the EBTC region; and it identified the origin-destination patterns of cross-border truck movements, providing a better understanding of trade patterns within the region and quantified the amount of "through traffic" traveling along the region's highway network.

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[1] U.S. Census Foreign Trade Statistics, 2003.

[2] Ibid.

[3] Members of the EBTC include State and Provincial transportation agencies of Maine, Michigan, New Brunswick, Newfoundland and Labrador, New York, Nova Scotia, Ontario, Prince Edward Island, Quebec, and Vermont; the Metropolitan Planning Organizations of the Buffalo and Detroit areas; and the Regional Municipality of Niagara.

While the *Truck Freight Crossing the Canada-U.S. Border* study allowed EBTC members to better understand the trade and travel patterns of cross-border truck traffic, it did not provide a comprehensive picture of all surface freight movements between the United States and Canada. A significant amount of cross-border trade occurs by rail, with the value of rail traffic traveling between the United States and Canada having grown by over 17 percent since 1995.[4]

The freight rail system is a critical component of the EBTC region's overall transportation network, particularly for intermodal freight, which often depends on partnerships with trucking companies, ports, and others in the transportation logistics chain. Railroads have taken responsibility for the long-haul movement of large quantities of intermodal containers and trailers between major hubs such as ports and major population centers, while truckers have taken responsibility for the short-haul movement to/from the customer's "front door." Rather than competing for freight traffic, truck-rail partnerships likely will be enhanced in the future as freight movements, particularly intermodal freight shipments through the region's ports and by the automotive industry, continue to rise. Despite these trends, cross-border rail movements can sometimes be overlooked by statewide, provincial, and metropolitan transportation planning agencies and decision-makers, because rail networks are typically privately owned, operated, and financed, and nearly 75 percent of U.S.-Canada trade occurs by truck. Rail is the dominant mode of transportation for some cross-border commodities, however, and is playing an increasingly important role in transporting containerized freight, automobiles, and auto components within the region.

In order to develop a more comprehensive understanding of land trade between the United States and Canada, the EBTC undertook this *Study of Rail Freight Crossing the Canada-U.S. Border*. This report summarizes the existing cross-border rail flows originating, terminating, or crossing the Canada-U.S. border within the EBTC region and describes how those movements may change in the future. The results of this study can be a critical first step in understanding the volume of freight crossing the Canada-U.S. border by rail and understanding the impacts of those movements on the region's transportation system and economic competitiveness.

The remainder of this report is organized as follows:

- **Section 2.0, Cross-Border Freight Rail Data Selection and Enhancements,** describes the existing sources of cross-border freight rail data, the data selected for use in the cross-border freight rail analysis, and how those data were enhanced to meet the needs of this study;

- **Section 3.0, Existing Cross-Border Rail Flows,** provides a summary of cross-border rail freight originating, terminating, or crossing the Canada-U.S. border in the EBTC region;

[4] U.S. Bureau of Transportation Statistics, 2003.

- **Section 4.0, Forecast Commodity Flows,** provides an overview of the method used to forecast cross-border rail freight flows to 2020 and summarizes cross-border rail freight expected to originate, terminate, or cross the Canada-U.S. border in the EBTC region in 2020; and

- **Section 5.0, Findings, Conclusions, and Recommendations,** summarizes the key findings of the commodity flow and forecast analyses, and provides recommendations to the EBTC to guide future cross-border rail activities.

- **Appendix A** provides an assessment of the four Canada-United States rail datasets that were considered for the project, highlighting the strengths and weaknesses of each.

- **Appendix B** compares and contrasts the different types of information available from each of the datasets considered.

- **Appendix C** provides tables that detail the annual tonnage and value of goods carried by rail between Canada and the Unites States.

- **Appendix D** provides a list of the Standard Classification of Transported Good (SCTG) codes and the associated commodity descriptions.

2.0 Cross-Border Freight Rail Data Selection and Enhancements

The purpose of this report is to provide the EBTC and its member agencies with a more comprehensive understanding of the volume and value of cross-border rail freight originating, terminating, or crossing the Canada-U.S. border within the EBTC region. There are several sources of cross-border rail freight data, each of which describes different aspects of a cross-border freight rail movement. This section provides an overview of existing cross-border freight rail datasets and their characteristics; evaluates their appropriateness for use in this study; describes the dataset selected for use in this study; and describes the ways that this dataset was enhanced to meet the needs of this study.

2.1 Cross-Border Freight Rail Data Selection

Overview of Cross-Border Rail Datasets

There are several existing datasets that can be used to describe cross-border freight rail flows between the United States and Canada, including:

- **Reebie Associates TRANSEARCH Data,** a privately maintained commodity flow database that includes information on cross-border rail flows;
- **Statistics Canada Cross-Border Rail Data,** which were recently purchased by the Ministry of Transport Ontario (MTO) to support rail planning and modeling activities;
- **FHWA Freight Analysis Framework (FAF) Data,** which have been used by FHWA staff to understand the magnitude of freight flows across all modes in North America;
- **U.S. Bureau of Transportation Statistics Border Crossing Data,** which are based on customs information and summarized annually by the U.S. Bureau of Transportation Statistics (BTS); and
- **Transborder Surface Freight Trade (TSFD) Data,** which are based on customs bills and summarized annually by the BTS.

The following sections provide more detailed overviews of each of these cross-border rail datasets.

Reebie Associates' TRANSEARCH

TRANSEARCH is a privately maintained comprehensive market research database for intercity freight traffic flows compiled by Reebie Associates. The database includes information that describes commodities using two- or four-digit Standard Transportation Commodity Classification (STCC) codes and provides information on tonnage, origin and destination markets, and mode of transport. Data are obtained from Federal, state, and provincial agencies, trade and industry groups, and a sample of private sector freight transportation providers. TRANSEARCH includes the following characteristics for cross-border rail movements:

- Origin and destination by U.S. county and Canadian province;
- Two-digit or four-digit STCC commodity detail;
- Weight detail (in U.S. short tons);
- Value detail (in U.S. dollars); and
- Crossing detail (i.e., the county where the rail freight crosses the Canada-U.S. border).

Statistics Canada Cross-Border Rail Data

The Ministry of Transport Ontario (MTO) recently purchased data from Statistics Canada describing merchandise trade between the United States and Canada. Both "import" (U.S. to Canada) and "export" (Canada to U.S.) data were provided. Data fields include:

- **Mode of transport,** in this case rail only;
- **Year,** in this case 2001;
- **Commodity classification,** at the two-digit Harmonized System (HS) and two-digit SCTG levels;
- **Port,** which is the port of customs clearance (not the gateway where the rail crossed the border);
- **Weight,** in kilograms; and
- **Value,** in $Canadian.

FHWA Freight Analysis Framework (FAF) Data

The Freight Analysis Framework (FAF) data are based on Reebie Associates' TRANSEARCH database. The FAF provides flows of domestic and international commodities originating and terminating in the 50 states on four modes, including rail. The database was a tool used by the FHWA as part of its Freight Productivity Program to understand freight demands and develop policy and program initiatives to improve freight efficiency. Commodities in the FAF database are classified using STCC codes at the two-digit level. Cross-border rail flows available from the FAF include state or province of origin and state or province of destination. Detailed information describing

the gateways utilized by cross-border rail traffic (i.e., where the freight crossed the border) are not available.

U.S.-Canada Border Crossing Data

The U.S. Bureau of Transportation Statistics (BTS) provides U.S.-Canada annual border crossing data beginning in 1997. These data are collected monthly at border ports by the U.S. Bureau of Customs and Border Protection (CBP) and are summarized and organized at the port level by BTS. Rail data provided within this dataset reflect the number of trains and loaded and unloaded containers that have entered the United States along the U.S.-Canadian border, but provide no information on origins or destinations, commodities handled, or routes utilized. The U.S. CBP does not collect comparable data on vehicles traveling from the U.S. to Canada.

Transborder Surface Freight Trade Data

The Transborder Surface Freight Trade dataset (TSFD) is maintained by BTS and data are available from April 1993 forward. This dataset provides information describing the value of North American trade by commodity; surface mode of transportation (rail, truck, pipeline, mail, and other); and shipment origin and destination (state, province, U.S. Customs Port of Entry, or Canadian point of clearance). TSFD data are updated monthly and are extracted from the U.S. Census Foreign Trade Statistics Program. Import and export data are captured from administrative records required by the U.S. Departments of Commerce and Treasury.

Assessment of Existing Cross-Border Rail Datasets

The datasets described above were evaluated for their ability to meet the needs of this study. There are four characteristics that can be used to describe a cross-border commodity flow database. The dataset most appropriate for use in this study is one that contains each of the following elements.

- **Commodity Detail.** The dataset should provide adequate detail describing the types of commodities crossing the border. STCC codes, Standard Classification of Transported Good (SCTG) codes, or HS codes at the two-digit level are commonly used commodity classification schemes.

- **Commodity Weight Detail.** Data describing the weight of classified commodities crossing the border are important in understanding the ways in which freight vehicles are using the transportation system. These data are also necessary to complete the commodity flow analysis component of this study.

- **Commodity Value Detail.** Data describing the value of commodities crossing the border are useful in creating a more holistic picture of cross-border freight movements and how they may affect statewide, provincial, and regional economies.

- **Gateway Detail.** This characteristic is unique to cross-border studies. Understanding precisely where commodities cross the border (gateways) is important in estimating trade patterns and associated transportation impacts. Unfortunately, many cross-border datasets – particularly those that rely on customs information – do not accurately report gateway information, instead reporting where customs bills are paid (which may involve customs brokers or company headquarters) as opposed to the actual shipping and receiving locations.

Table 2.1 summarizes the degree to which each of the available cross-border rail databases meet these criteria. A more detailed analysis of these cross-border rail databases is provided in Appendix A.

Table 2.1 Summary of Cross-Border Rail Databases

	Criteria			
Cross-Border Rail Dataset	**Commodity Detail**	**Commodity Weight Detail**	**Commodity Value Detail**	**Gateway Detail**
Reebie Associates TRANSEARCH	●	●	●	●
Statistics Canada	●	◒	◒	○
Freight Analysis Framework	●	●	●	○
BTS Border-Crossing Data	○	○	○	●
Transborder Surface Freight Trade Data	○	●	●	◒

● Acceptable.

◒ Partially Acceptable.

○ Unacceptable.

Based on this analysis, Reebie Associates' TRANSEARCH cross-border rail database was selected for use in this project. The dataset used in this analysis contained 42,494 records with the following characteristics:

- Origin and destination of cross-border rail flows by U.S. county and Canadian province;
- Two-digit STCC commodity detail;
- Crossing detail (i.e., the county where the rail freight crossed the Canada-U.S. border); and
- Commodity value (in U.S. dollars).

2.2 Cross-Border Freight Rail Data Enhancements

A key outcome of this study was to provide a cross-border rail database that could help the EBTC and its member agencies better understand the volume and value of cross-border rail traffic by individual rail gateway and that could be used to support transportation planning activities. In order to conduct the commodity flow analysis and forecasts described later in this report, two specific enhancements were made to the EBTC Cross-Border Rail TRANSEARCH database:

- Assignment of county gateways to actual crossings or groups of crossings; and
- Assignment of unknown gateways to crossings.

Assignment of County Gateways to EBTC Crossings

The EBTC Cross-Border Rail TRANSEARCH database listed gateways by U.S. county names. These individual county gateways were grouped into the crossings approved by the EBTC Rail Study Committee. These crossings are shown in Figure 2.1.

Figure 2.1 EBTC Cross-Border Rail Crossings

Table 2.2 shows the specific counties included in the crossings displayed in Figure 2.1. There are several instances where individual crossings were grouped into "gateways," because of their close proximity to each other or because they are located in the same county.[5] These gateways include Niagara-Buffalo, which includes the Niagara Falls crossing and the Fort Erie Rail Bridge; Ft. Covington-Trout River, which includes the individual Ft. Covington and Trout River, New York crossings, and Calais-Vanceboro, which includes individual crossings located in Calais and Vanceboro, Maine.

Table 2.2 EBTC Gateways and Associated Counties

Gateway	Gateway Counties
International Falls Bridge	• Kittson County, Minnesota • Roseau County, Minnesota • Koochiching County, Minnesota
Sault Ste. Marie Bridge	• Chippewa County, Michigan
St. Clair River Tunnel	• St. Clair County, Michigan
Windsor-Detroit Tunnel	• Wayne County, Michigan
Niagara-Buffalo	• Erie County, New York • Niagara County, New York
Ft. Covington-Trout River	• St. Lawrence County, New York • Franklin County, New York
Champlain-Rouses Point	• Clinton County, New York
Alburg	• Grand Isle County, Vermont • Franklin County, Vermont
Derby Line	• Orleans County, Vermont
Norton	• Essex County, Vermont
Lowellton	• Somerset County, Maine • Franklin County, Maine
Van Buren	• Aroostook County, Maine
Calais-Vanceboro	• Washington County, Maine

[5] As the TRANSEARCH dataset used in this analysis provided cross-border rail flows at the county level, it is difficult to determine the flows across individual crossings when they are located within the same county. It is more accurate to combine these crossings into a single "gateway" rather that disaggregate and assign county-level flows to individual crossings.

Assignment of Unknown Records to Gateways

In some cases, the border county through which a U.S.-Canada rail flow passed was not known. These records were addressed in one of three ways:

1. **Flows Were Assigned to a Specific Gateway**. Each record in the TRANSEARCH dataset consists of an origin-destination-commodity combination. In many cases, flows through unknown gateways were assigned to specific gateways by comparing them with known origin-destination-commodity combinations. If a single origin-destination-commodity match was found, the gateway from that match was assigned to the missing field. Approximately 25 records were assigned to a specific gateway using this method.

2. **Flows Were Assigned to an "Unknown EBTC Gateway."** Flows originating in states east of (and including) Minnesota, Iowa, Missouri, and Louisiana and terminating in Ontario or east were assigned to an "unknown EBTC gateway," as an analysis of the cross-border rail network indicates that flows between these origins and destinations are likely routed through a gateway within the EBTC region. 5,591 records were assigned to an "Unknown EBTC Gateway."

3. **Flows Were Assigned to an "Unknown Gateway."** In some cases, it is difficult to determine precisely where some cross-border flows crossed between the United States and Canada. This is particularly true for flows originating west of Minnesota, Iowa, Missouri, and Louisiana, which could cross the border within or outside the EBTC region. For this reason, these flows were assigned to an "unknown gateway." 1,575 records were assigned to an "Unknown Gateway."

The enhancements made to the EBTC Cross-Border Rail TRANSEARCH database facilitated the base year commodity flow analysis and the development of a cross-border rail forecast described in subsequent sections of this report. This enhanced dataset was also provided to the EBTC and its member agencies for use in their own transportation planning activities.

3.0 Existing Cross-Border Rail Flows

This section provides a summary of cross-border rail flows originating, terminating, or crossing the U.S.-Canada border within the EBTC region. This quantitative commodity flow analysis will provide the means to better understand the degree of land trade between the United States and Canada.

Over 87.6 million tons of rail freight crossed the U.S.-Canada border in 2001,[6] approximately 62.5 percent of which originated, terminated, or crossed the border within the EBTC region. Table 3.1 shows the total trade within the EBTC region by rail, estimated at almost 54.8 million tons with a combined value of approximately $71.4 billion (in U.S. dollars). Figures 3.1 and 3.2, displaying U.S.-Canada and Canada-U.S. flows by weight and value, respectively, show that approximately 75 percent of cross-border EBTC trade originates in Canada.

Table 3.1 Total U.S.-Canada Rail Trade within the EBTC Region

	Weight (Tons)	Value (Millions of U.S. Dollars)
U.S.-Canada	14,326,045	$16,677.5
Canada-U.S.	40,507,726	$54,742.6
Total	**54,833,771**	**$71,420.1**

[6] Transport Canada, T-Facts, 2003.

Figure 3.1 Total EBTC Trade in Tons

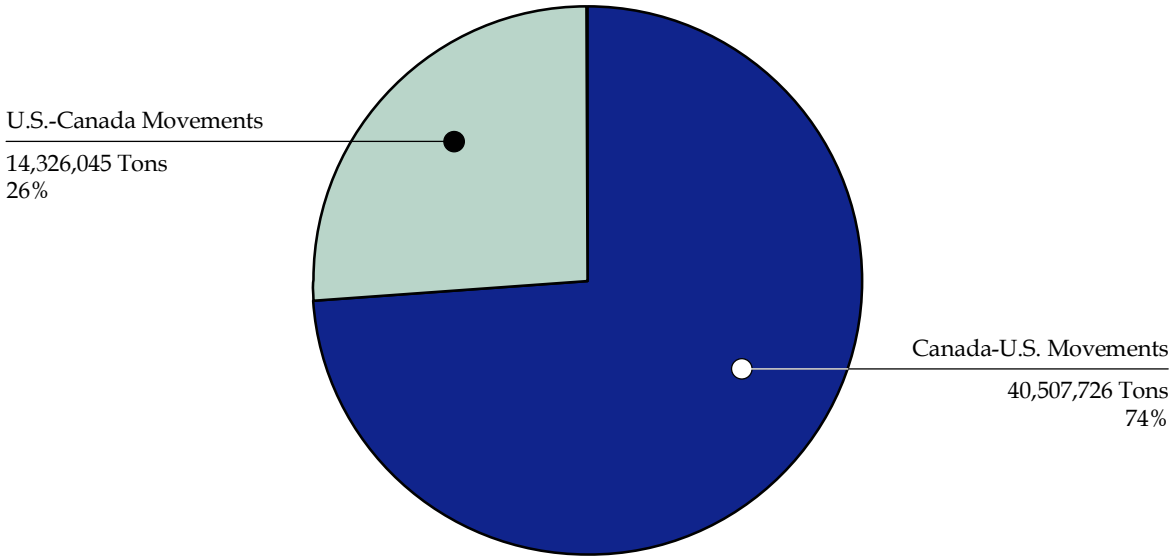
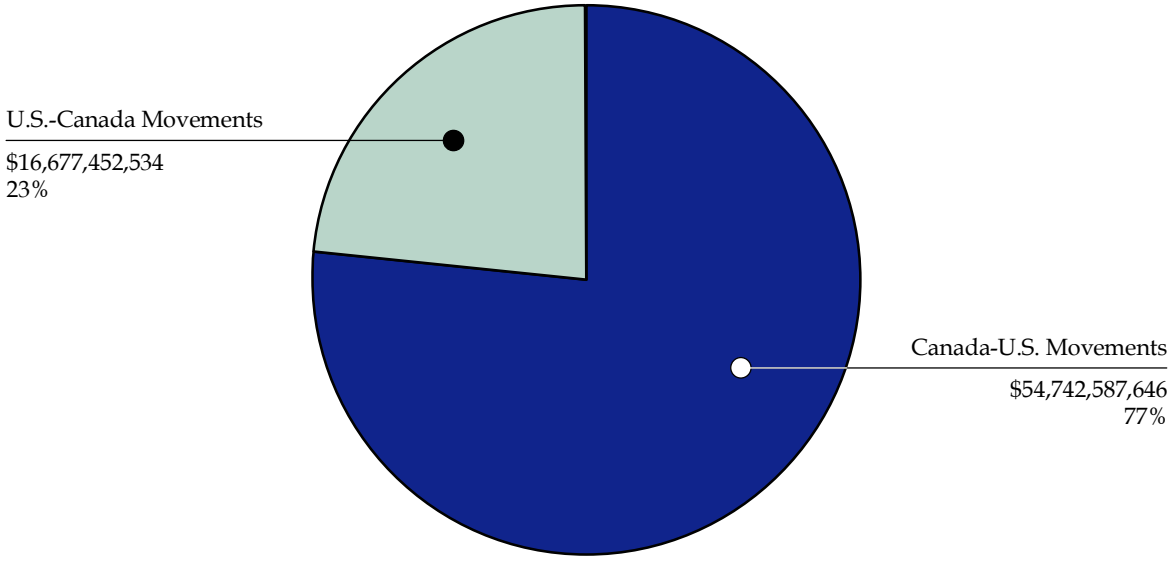


Figure 3.2 Total EBTC Trade by Value

U.S. Dollars

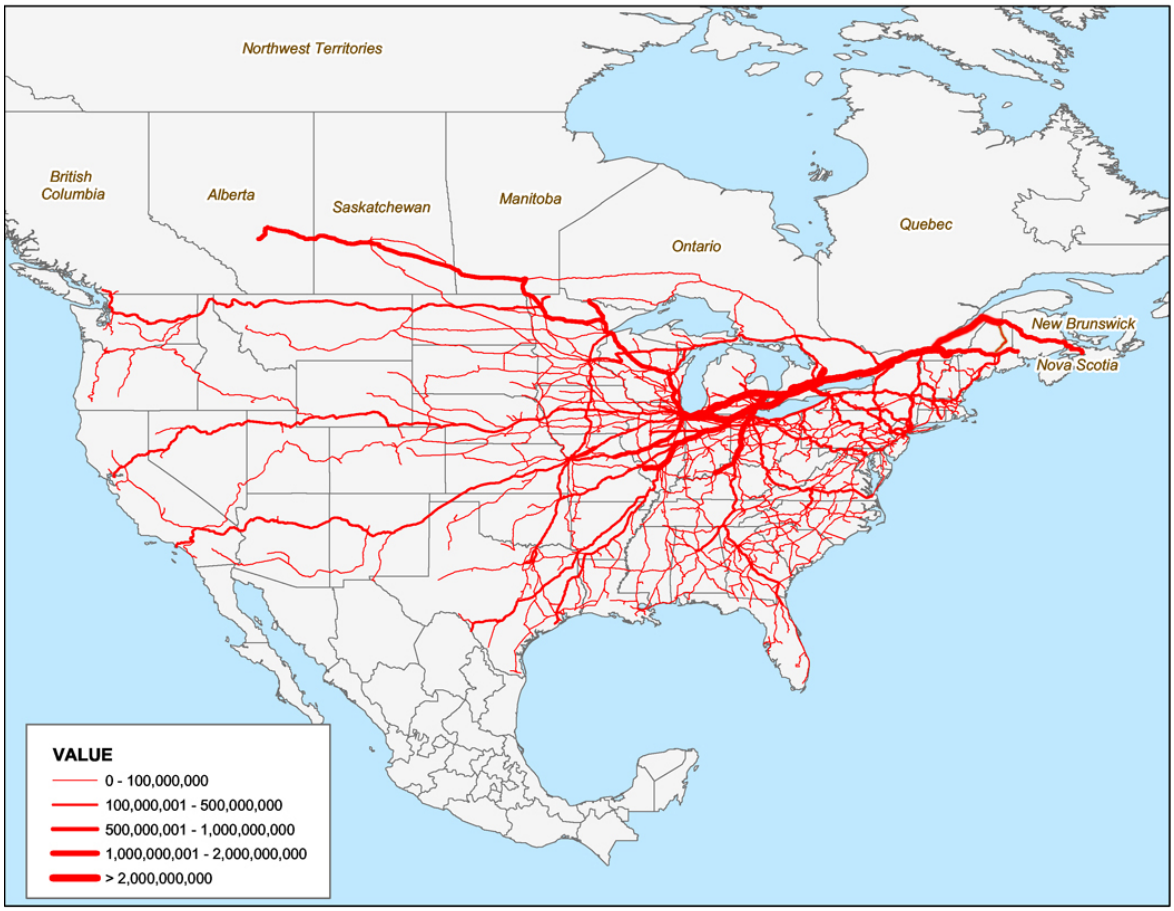


Figures 3.3 and 3.4 show the flows of cross-border rail traffic (by weight and value) along the North American rail network. It is clear that the impacts of cross-border rail traffic are not limited to the EBTC's rail network, as cross-border rail traffic have origins and destinations both within and outside the EBTC region, as will be discussed in more detail in subsequent sections. Appendix C provides summary tables of cross-border rail traffic (by weight and value).[7]

Figure 3.3 Total EBTC Cross-Border Rail Flows
By Weight

[7] The maps provided in this section, like all maps, should be interpreted judiciously. While maps can be effective tools with which to illustrate freight flows affecting the EBTC region, they are often developed at an aggregate level of detail and may not reflect actual flows along specific rail corridors or networks.

Figure 3.4 Total EBTC Cross-Border Rail Flows by Value
U.S. Dollars



3.1 Top Commodities

It is important to understand the types of commodities that are moved along the EBTC region's rail infrastructure in order to understand which industries are using the region's rail system. While the EBTC Cross-Border Rail TRANSEARCH database provided commodity information at the two-digit STCC level, commodities were assigned to commodity groups based on the SCTG system for analysis, to ensure consistency with the *Truck Freight Crossing the Canada-U.S. Border* study completed by the EBTC in 2002. Table 3.2 describes the commodity groupings and the SCTG codes included in those groupings. A detailed description of each of the SCTG codes is provided in Appendix D.

Table 3.2 Commodity Groupings and Description

SCTG Codes	Description
01-05	Agricultural products and fish
06-09	Grains, alcoholic beverages, and tobacco
10-14	Stone, minerals, and ores
15-20	Coal and petroleum products
21-24	Pharmaceutical and chemical products
25-30	Wood products, textiles, and leather
31-34	Metal products and machinery
35-38	Electronics, vehicles, and precision goods
39-43	Furniture and miscellaneous products
–	Hazardous materials

Commodity flows were analyzed and reported by both weight (in U.S. short tons) and value (in U.S. dollars). Understanding the weight of commodities that are transported along the EBTC's rail network is important in understanding the ways in which the freight railroads serving the region are using the system and can facilitate the identification of key rail chokepoints that can hinder regional and cross-border rail movements. An understanding of the value of rail freight shipments within the EBTC region is also important, particularly since high-value industries, such the auto industry in Michigan and Ontario, are concentrated in the region.

Figure 3.5 shows the top commodities for total EBTC cross-border rail traffic by weight. The top four commodity groups accounted for 77 percent of the total flows by weight, or 45.6 million tons. These commodity groups consisted of wood products, textiles, and leather (26 percent); pharmaceutical and chemical products (24 percent); stone, minerals, and ores (17 percent); and electronics, vehicles, and precision goods (10 percent).

Figure 3.5 Overall EBTC Top Commodities by Weight

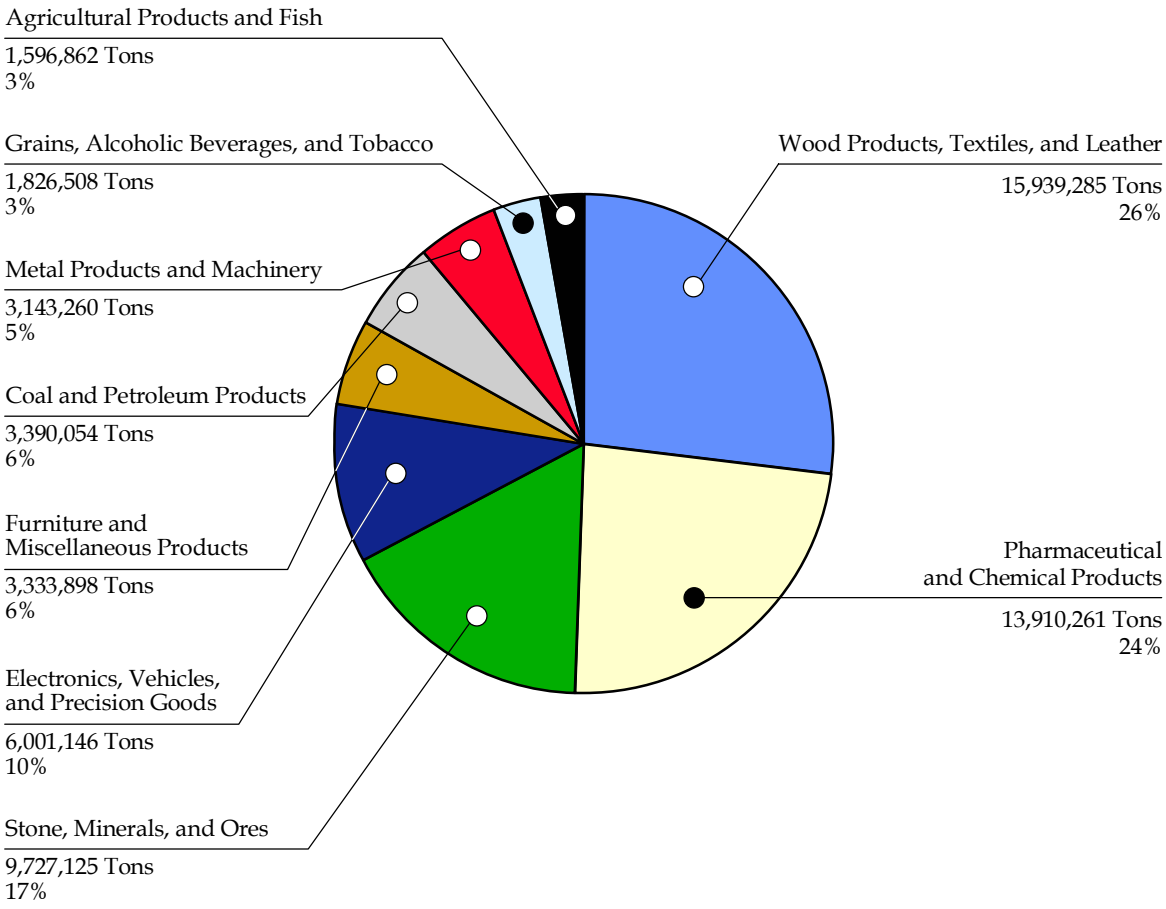
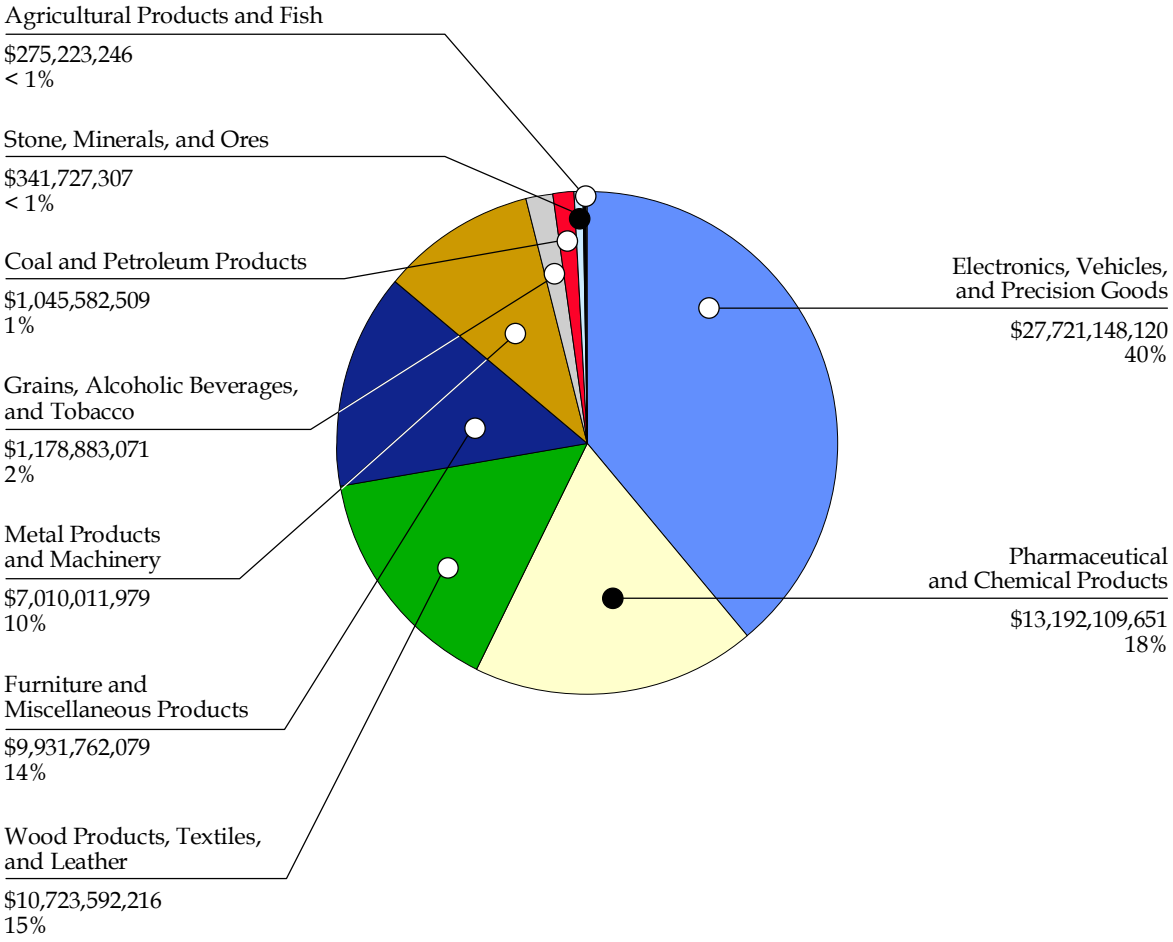


Figure 3.6 shows the top commodities for total EBTC cross-border rail traffic by value. The top four commodity groups accounted for approximately 87 percent of the total flows by value, or $61.6 billion (U.S. dollars). These commodity groups consisted of electronics, vehicles, and precision goods (40 percent); pharmaceutical and chemical products (18 percent); wood products, textiles, and leather (15 percent); and furniture and miscellaneous products (14 percent). This finding highlights the importance of rail freight to the automotive industry, which transports approximately $27.7 billion (U.S. dollars) worth of finished and partially finished automobiles and parts within the EBTC region each year.

Figure 3.6 Overall EBTC Top Commodities by Value
U.S. Dollars



Figures 3.7 and 3.8 show the top commodities by weight and value for U.S.-Canada movements and Canada-U.S. movements. Clearly, the United States is a net importer of cross-border rail freight, particularly for wood products, textiles, and leather; electronics, vehicles, and precision goods; and furniture. Trade between the United States and Canada is relatively balanced in pharmaceutical and chemical products and stone, minerals, and ores.

Figure 3.7 Trade Balance of Key Commodities by Weight

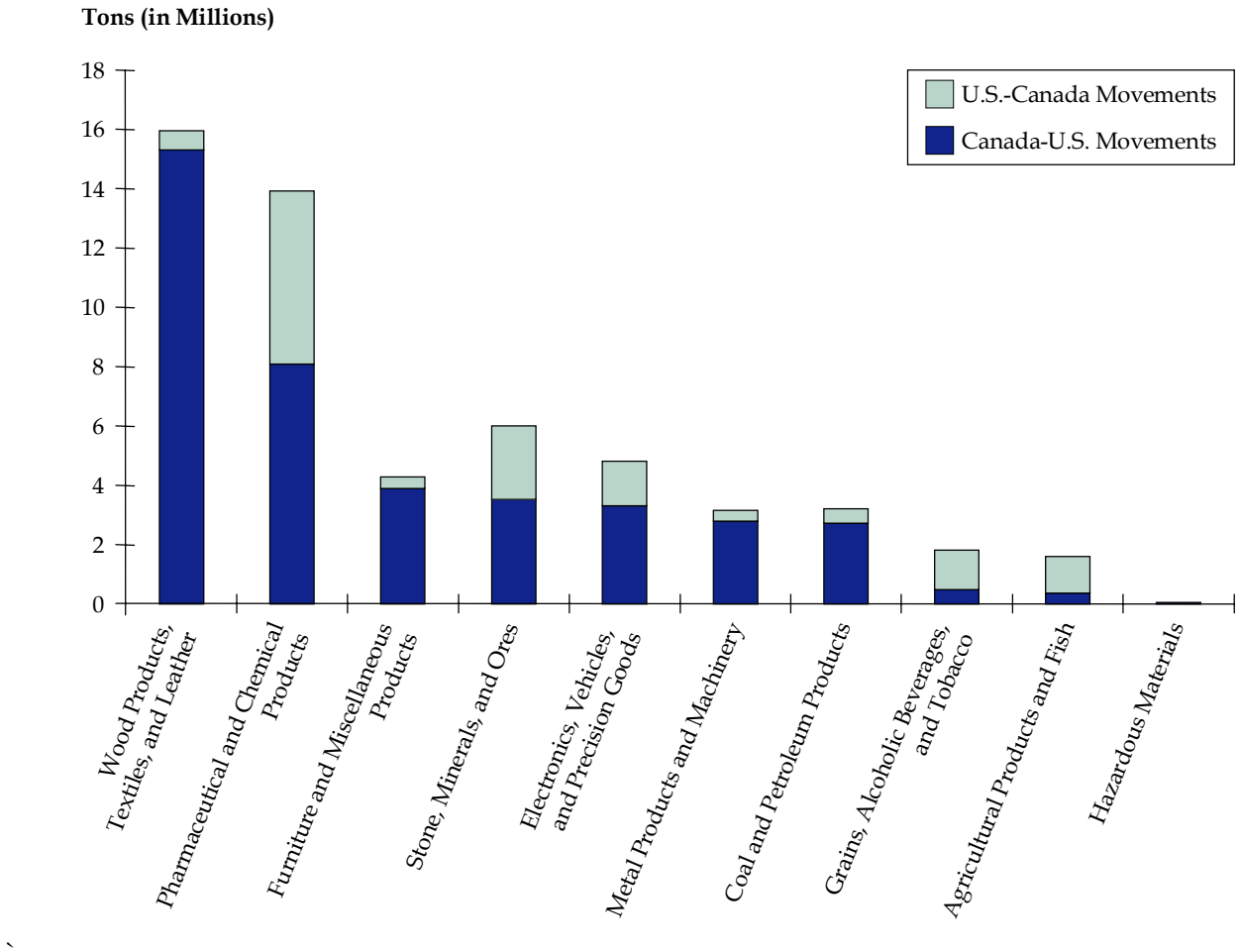
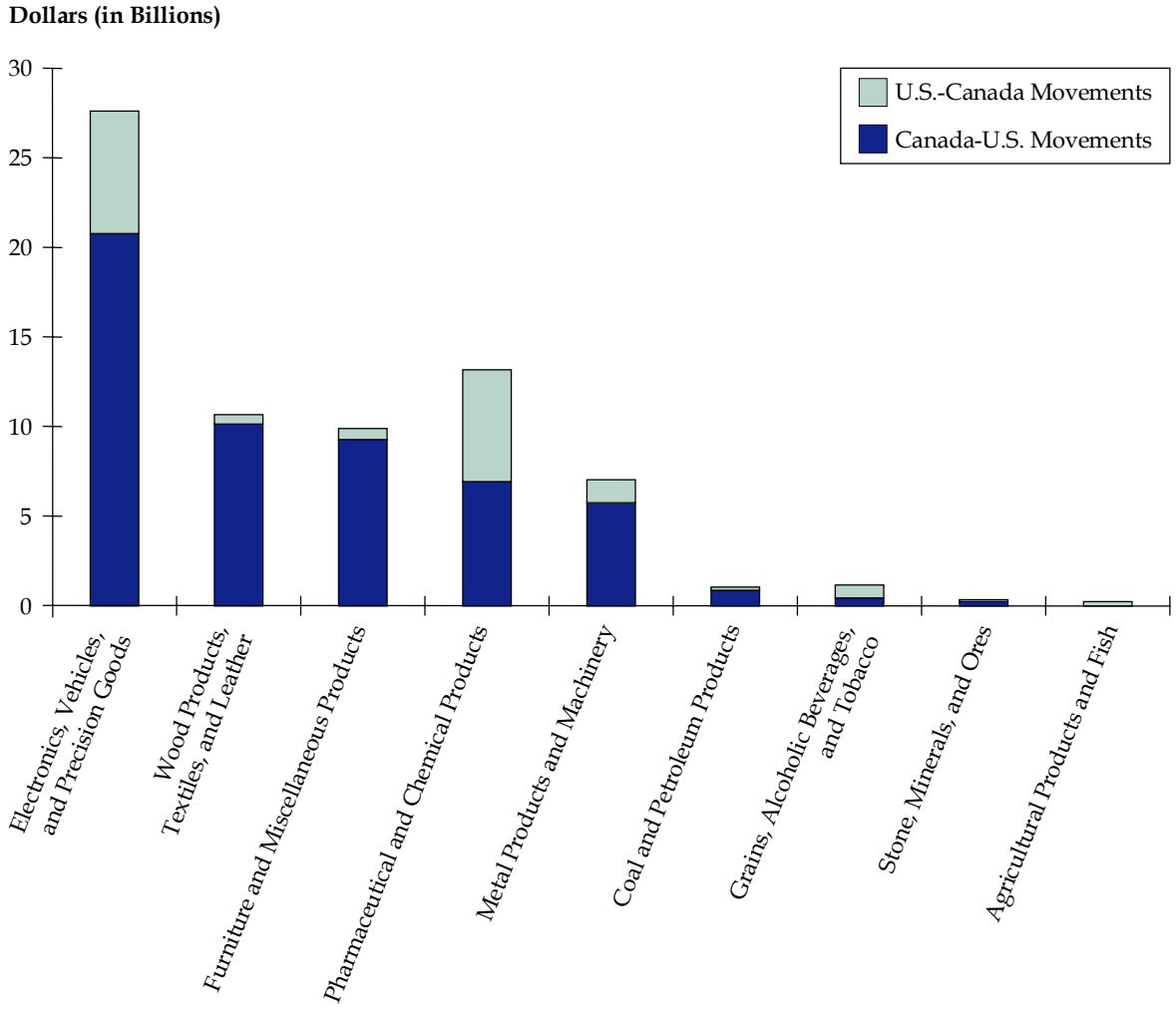


Figure 3.8 Trade Balance of Key Commodities by Value

U.S. Dollars



3.2 Gateways

An understanding of where cross-border rail traffic physically crosses the Canada-U.S. border is important for two reasons. First, these gateways can act as chokepoints that may hinder the efficiency of cross-border rail operations, driving up costs for shippers and consumers. Understanding the flows through these gateways is a first step in identifying and addressing these chokepoints. Second, though these gateways are an important component of the international supply and distribution chain, inefficiencies at these facilities can have local impacts on safety, security, and air quality. Again, understanding the ways in which these gateways are being used is an important first step to allow EBTC member agencies to address some of these local issues. This section provides an overview of the cross-border rail flows traveling through EBTC gateways. Subsequent sections describe flows across individual gateways. Appendix B provides a more detailed comparison of how the level of recorded commodity flows across the Canadian-U.S. border varies between the available datasets.

It should be noted that the total flows for each gateway within the EBTC region are likely slightly under-reported, as approximately 2.7 percent of the overall weight and 4.0 percent of the overall value of EBTC cross-border shipments were assigned to an unknown EBTC gateway, as discussed earlier. In addition, the commodity flow data used in this analysis – like all commodity flow data – are less accurate at the gateway level than they are at higher levels of geographic detail. One reason for this decrease in accuracy is that public entities are often prohibited from publishing data that would disclose the operations of individual firms or establishments. Many datasets aggregate commodity flow data for specific regions in such a way as to protect the confidentiality of industry participants. This is also a common practice for publicly available socioeconomic data, such as employment statistics. For this reason, the gateway flows described in this section may be difficult to validate with actual counts of cross-border rail traffic or to reconcile with other sources of cross-border data.

Figures 3.9 and 3.10 show the total cross-border rail flows by weight and value across each of the gateways in the EBTC region. As can be seen, cross-border rail flows are dominated by the two Detroit crossings, the Detroit-Windsor and St. Clair River Tunnels, which combined to handle 36.8 percent of the weight and 58.5 percent of the value of all cross-border rail flows originating, terminating, or crossing the northern border within the EBTC region. In fact, as shown in Figures 3.11 and 3.12, the Michigan-Ontario gateways combined to handle 39 percent of the total weight and 62 of the total value of all cross-border EBTC flows. The Niagara-Buffalo gateway, which handles a significant amount of consumer goods, such as electronics, furniture, and machinery; and the International Falls Bridge, which handles a significant amount of stone and ore, wood and lumber, and petroleum products are also high-volume gateways.

Figure 3.9 Cross-Border Rail Flows by Gateway by Weight

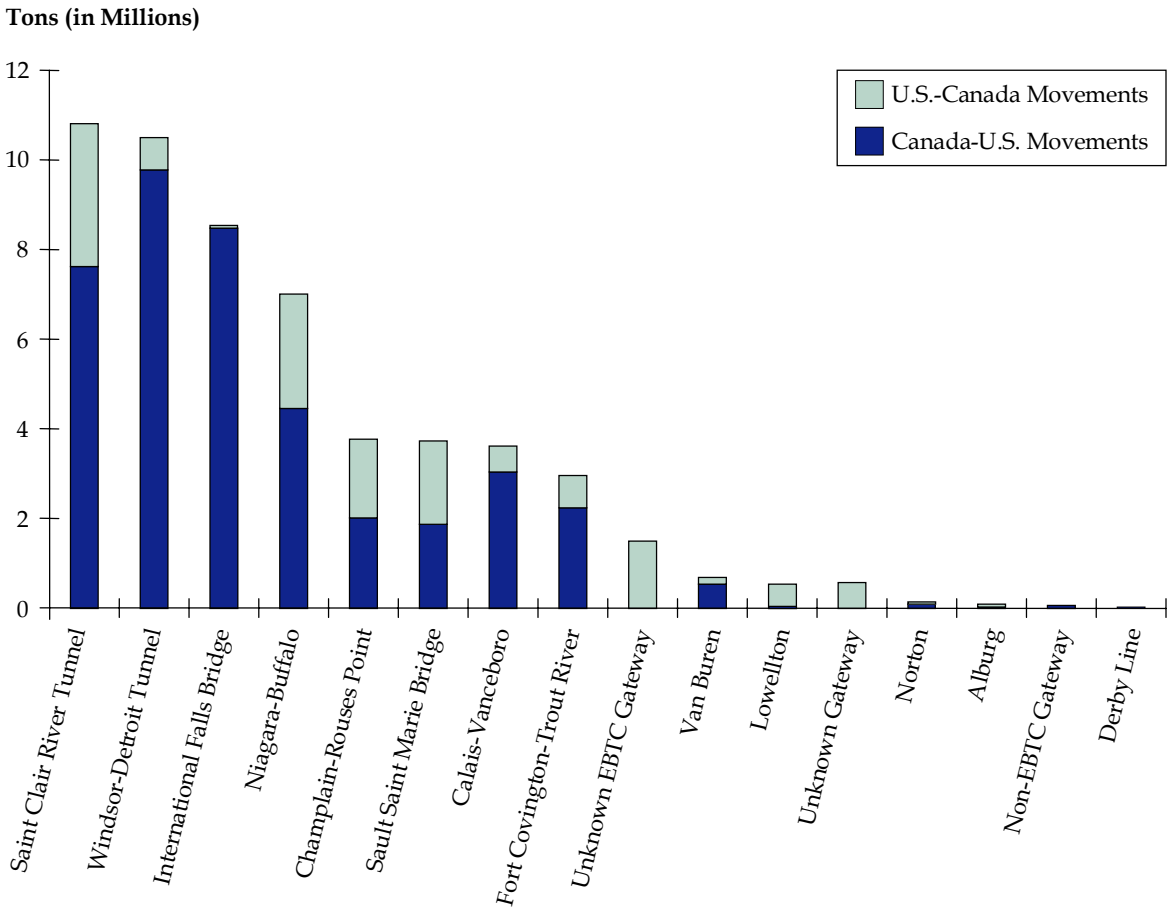


Figure 3.10 Cross-Border Rail Flows by Gateway by Value

U.S. Dollars

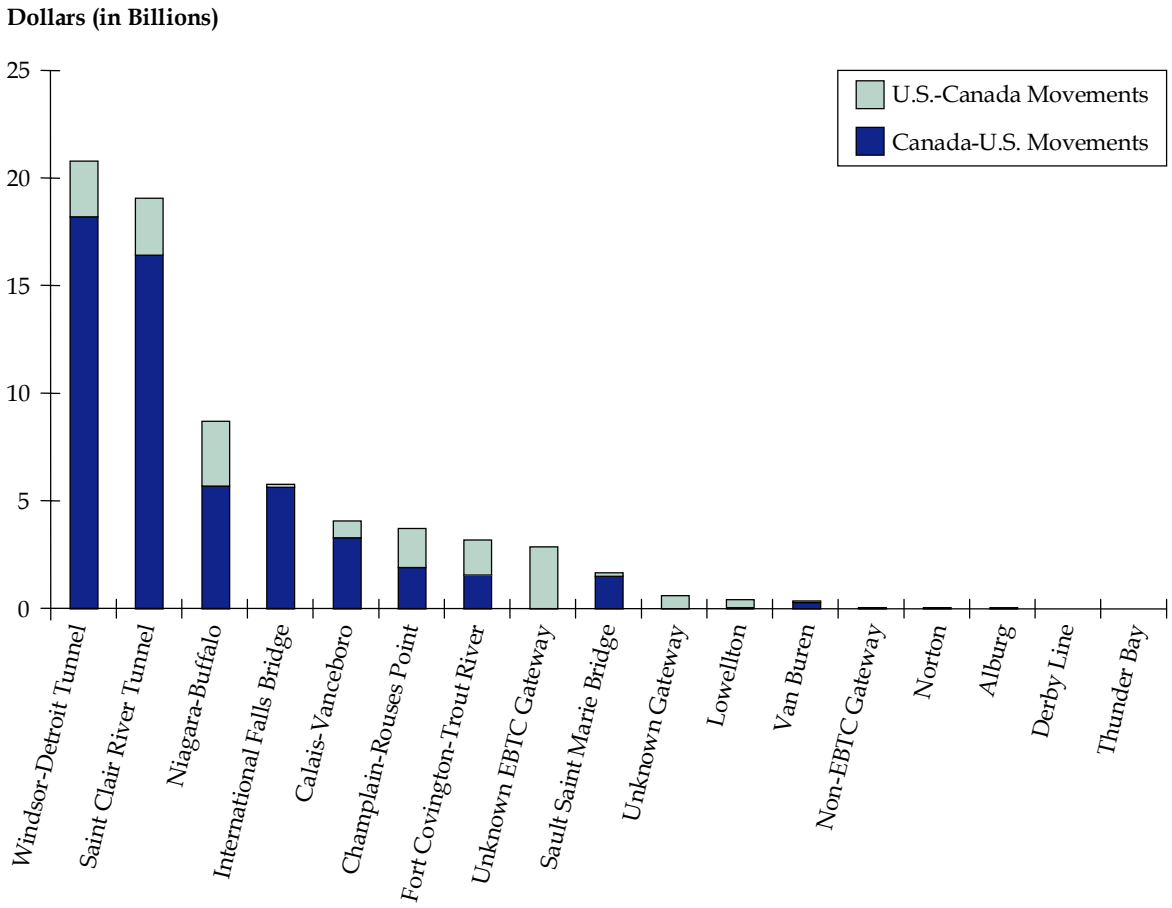


Figure 3.11 State-Province Gateways by Weight

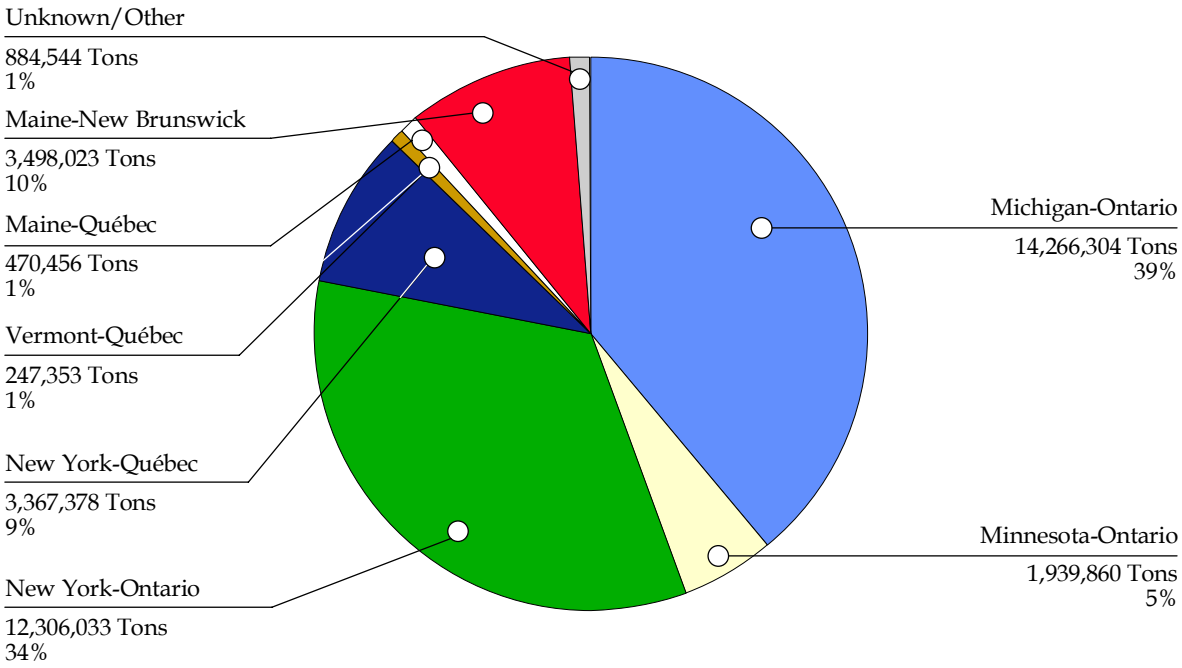
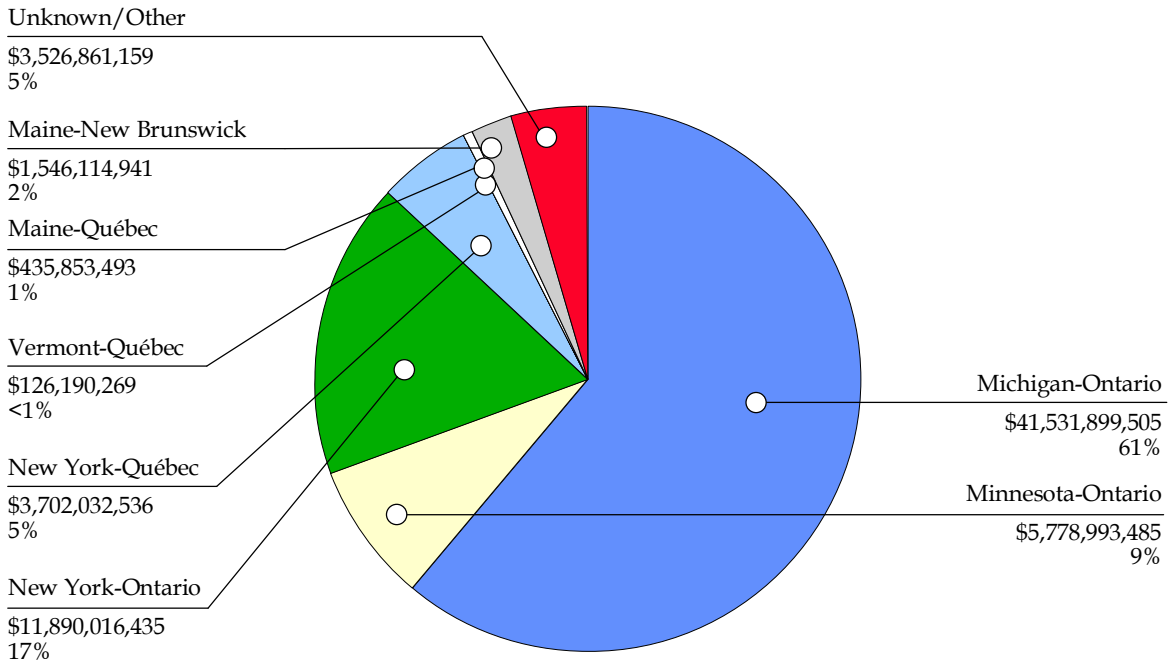


Figure 3.12 State-Province Gateways by Value

U.S. Dollars



3.3 Trading Partners and Patterns

Identifying and describing travel patterns of cross-border rail traffic is important in understanding the impact and reach of cross-border trade to both border and non-border states. This section presents the results of an analysis of cross-border rail trading patterns. Consistent with the *Truck Freight Crossing the Canada-U.S. Border* study, states were grouped into three categories, described below and in Table 3.3:

- **Border states,** which are those located adjacent to the Canada-U.S. border;
- **Next tier states,** which are located adjacent to border states; and
- **Interior states**.

Table 3.3 State Types

State Type	States Included
Border States	Maine, Michigan, Minnesota, Vermont, New York, and Washington
Next Tier States	Illinois, Indiana, Massachusetts, New Jersey, Ohio, Oregon, Pennsylvania, and Wisconsin
Interior States	All other states

Figures 3.13 and 3.14 show the origins and destinations of cross-border rail trade originating, terminating, or crossing the border through the EBTC region by weight and value. Unlike the *Truck Freight Crossing the Canada-U.S. Border* study, which showed that about 50 percent of cross-border truck trips are bound to and from border states, over 80 percent of both the weight and value of cross-border rail trips in the region have origins or destinations away from the border. This is primarily due to the nature of rail freight movements, which typically provide the long-haul (greater than 500 miles) portion of an intermodal movement.

Figures 3.15 and 3.16 show the balance of trade by state. Clearly, non-border states are impacted by cross-border rail flows between Canada and the United States. In fact, the same 17 non-border states that were responsible for producing 56 percent of the goods that flowed into Canada by truck and 40 percent of the goods that entered the United States by truck also play a major role in rail-freight movement.[8] These states accounted for 66 percent of the weight and 71 percent of the value of United States-bound rail movements, and 52 percent of the weight and 63 percent of the value of Canada-bound rail movements.

[8] EBTC, *Truck Freight Crossing the Canada-U.S. Border* study, 2002.

Figure 3.13 EBTC Cross-Border Rail Trade by Weight

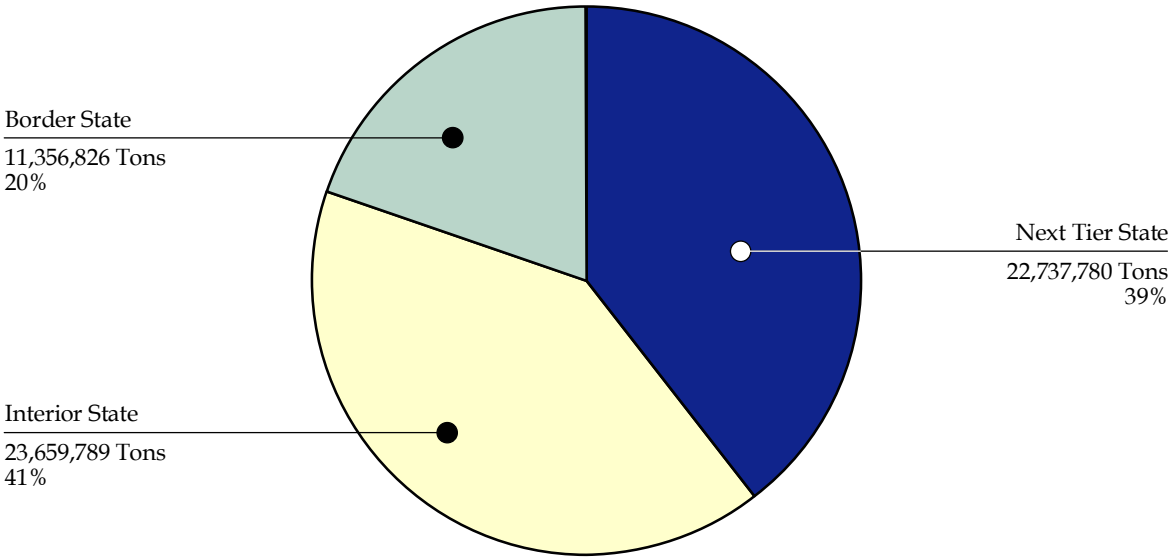


Figure 3.14 EBTC Cross-Border Rail Trade by Value

U.S. Dollars

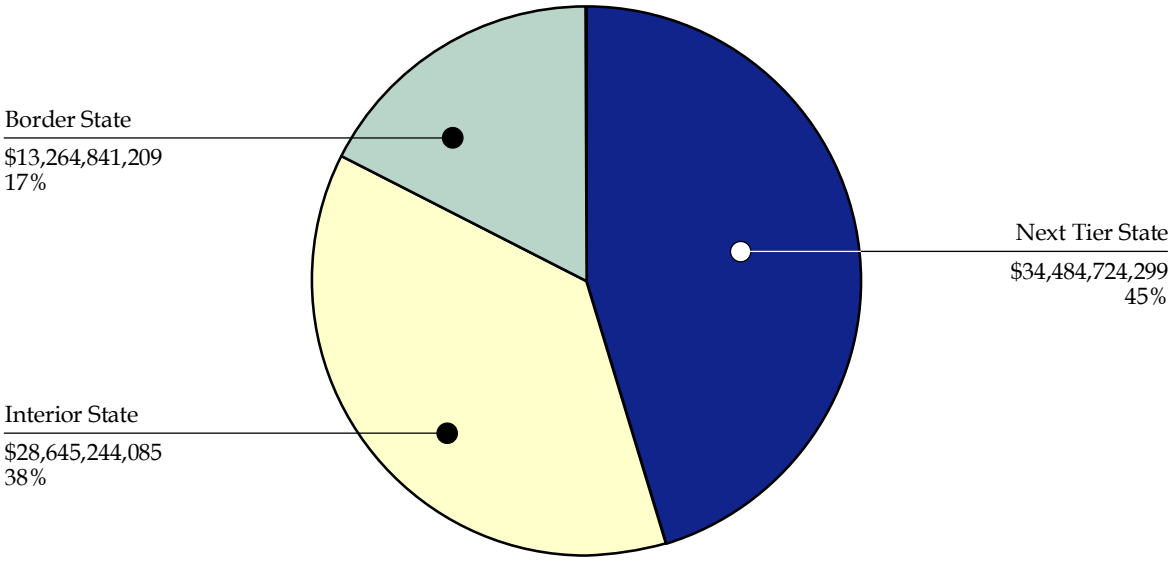


Figure 3.15 Balance of Trade by U.S. State by Weight

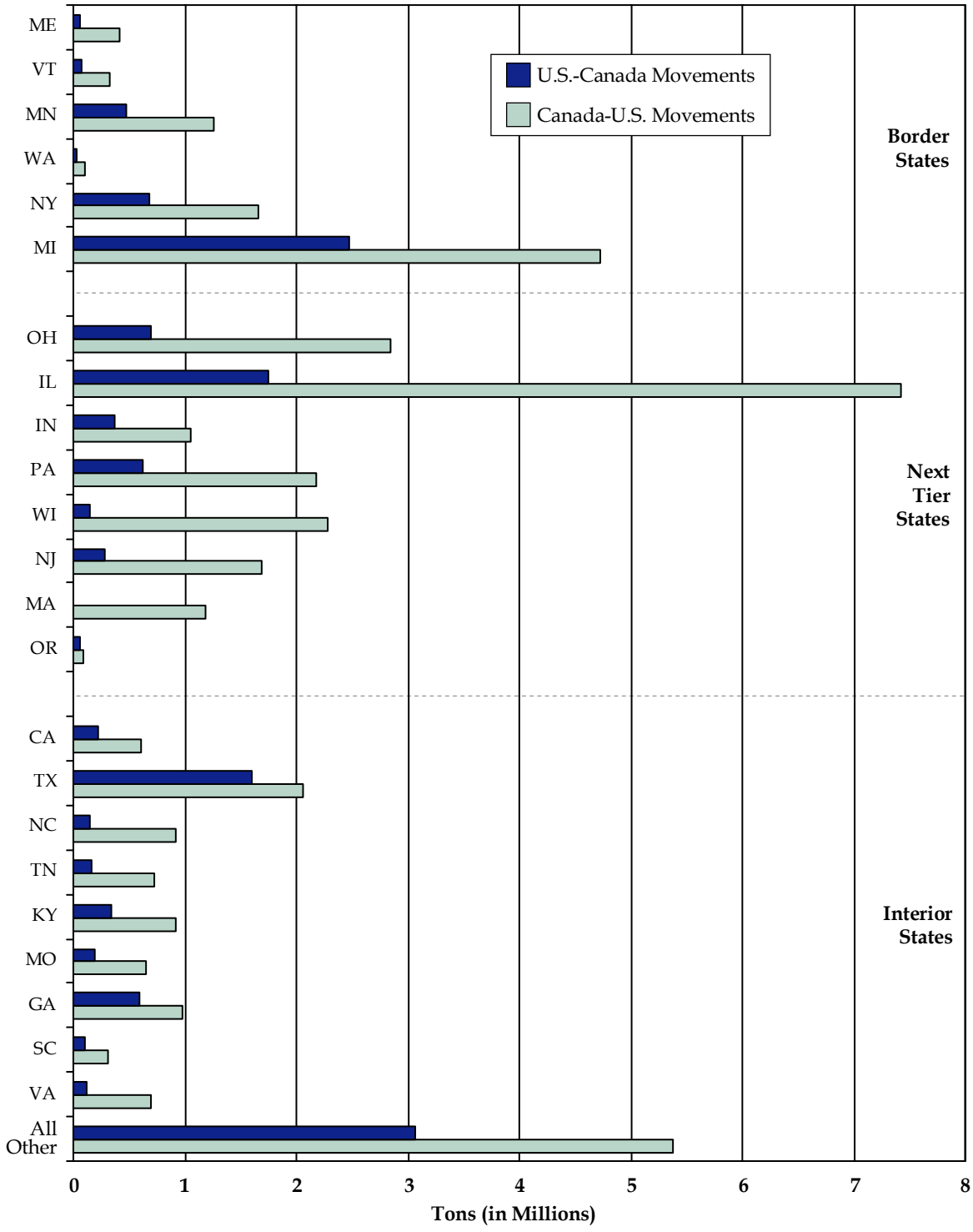
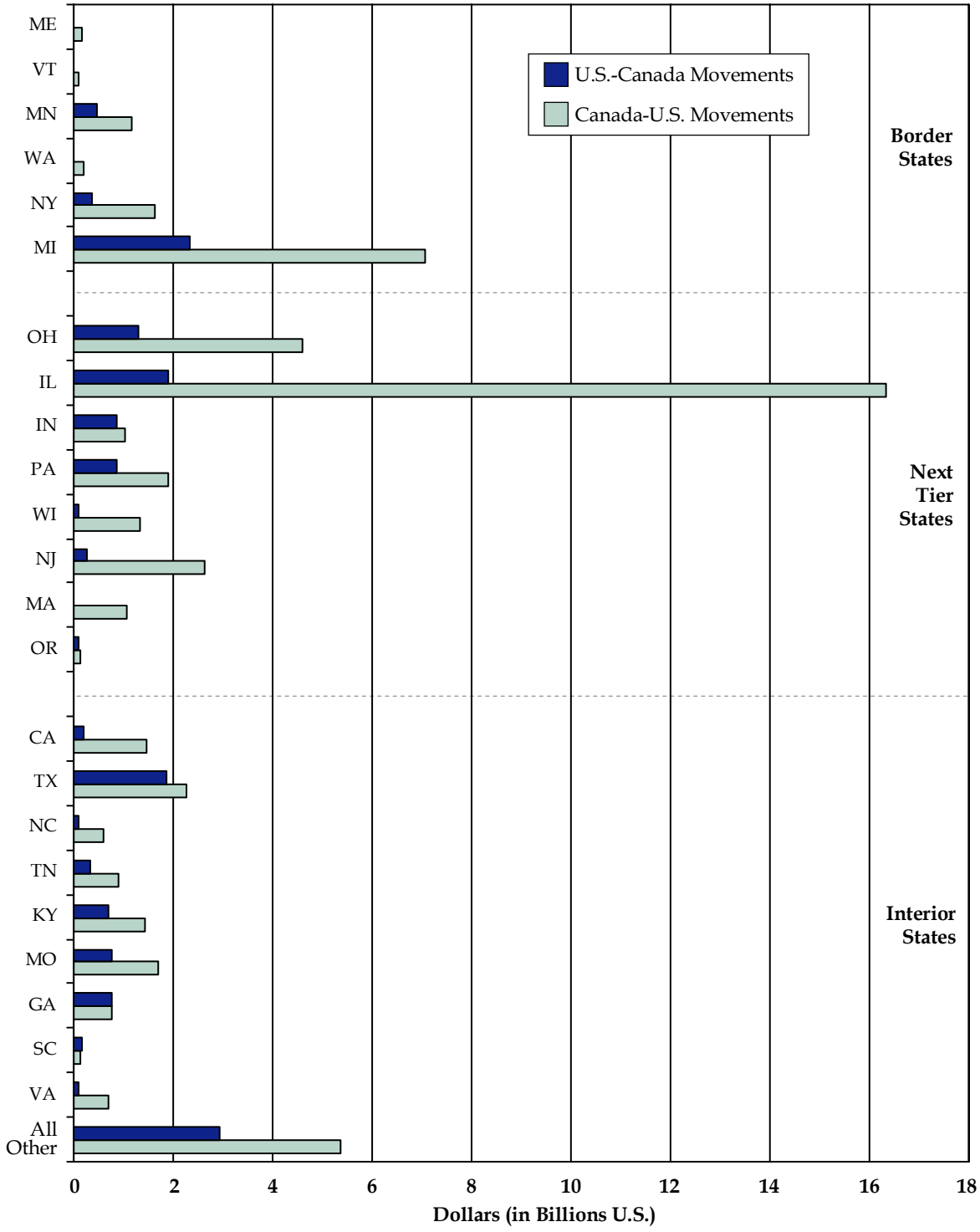


Figure 3.16 Balance of Trade by U.S. State by Value



3.4 Key Findings

There are several key findings of the analysis of existing cross-border rail flows originating, terminating, or crossing the northern border within the EBTC region, including:

- Over 87.6 million tons of rail freight crossed the entire U.S.-Canada border in 2001,[9] approximately 62.5 percent of which originated, terminated, or crossed the border within the EBTC region.

- The United States is a net importer of cross-border rail trade from Canada, particularly for wood products, textiles, and leather; electronics, vehicles, and precision goods; and furniture. Trade between the United States and Canada is relatively balanced in pharmaceutical and chemical products and stone, minerals, and ores. Approximately three-quarters of total EBTC cross-border rail flows originate in Canada.

- The impacts of cross-border rail traffic are not limited to the EBTC's rail network, as cross-border rail traffic have origins and destinations both within and outside the EBTC region. In fact, approximately 12.5 percent of the total weight and 20 percent of the total value of EBTC cross-border rail flows travel through Chicago, Illinois (where it is likely reclassified and shipped to more distant markets).

- Key commodities for cross-border rail traffic (by weight) include wood products, textiles, and leather (26 percent); pharmaceutical and chemical products (24 percent); stone, minerals, and ores (17 percent); and electronics, vehicles, and precision goods (10 percent). Combined, these top four commodity groups accounted for 77 percent of the total flows by weight, or 45.6 million tons.

- Key commodities for cross-border rail traffic (by value) include electronics, vehicles, and precision goods (40 percent); pharmaceutical and chemical products (18 percent); wood products, textiles, and leather (15 percent); and furniture and miscellaneous products (14 percent). These top four commodity groups accounted for approximately 87 percent of the total flows by value, or $61.6 billion (U.S. dollars). This finding highlights the importance of rail freight to the automotive industry, which transports approximately $27.7 billion (U.S. dollars) worth of finished and partially finished automobiles and parts within the EBTC region each year.

- Cross-border rail flows are dominated by the two Detroit crossings, the Detroit-Windsor and St. Clair River Tunnels, which combined to handle 36.8 percent of the weight and 58.5 percent of the value of all cross-border rail flows originating, terminating, or crossing the northern border within the EBTC region. In fact, the Michigan-Ontario gateways combined to handle 39 percent of the total weight and 62 of the total value of all cross-border EBTC flows. The Niagara-Buffalo gateway, which handles a

[9] Transport Canada, T-Facts, 2003.

significant amount of consumer goods, such as electronics, furniture, and machinery; and the International Falls Bridge, which handles a significant amount of stone and ore, wood and lumber, and petroleum products are also high-volume gateways.

- Unlike the *Truck Freight Crossing the Canada-U.S. Border* study, which showed that about 50 percent of cross-border truck trips are bound to and from border states, over 80 percent of both the weight and value of cross-border rail trips in the region have origins or destinations away from the border. This is primarily due to the nature of rail freight movements, which typically provide the long-haul (greater than 500 miles) portion of an intermodal movement.

- Non-border states are impacted by cross-border rail flows between Canada and the United States. The same 17 non-border states that were responsible for producing 56 percent of the goods that flowed into Canada by truck and 40 percent of the goods that entered the United States by truck also play a major role in rail-freight movement.[10] These states accounted for 66 percent of the weight and 71 percent of the value of United States-bound rail movements, and 52 percent of the weight and 63 percent of the value of Canada-bound rail movements.

[10]EBTC, *Truck Freight Crossing the Canada-U.S. Border* study, 2002.

4.0 Cross-Border Rail Forecasts

The previous section provided a detailed analysis of existing volumes and types of U.S.-Canada rail freight. This section will provide a forecast of how this trade could grow in the future, and what changes in the mix of goods might occur. As described earlier, the value of rail traffic traveling between the United States and Canada has grown by over 17 percent since 1995 and will likely continue to grow in the future.[11] The impact of such an increase on the region's rail infrastructure is far from negligible, and as such it is important to project how growth in cross-border rail traffic could further impact the region's existing rail infrastructure.

The value of a forecast lies in its ability to predict where demand on the rail system will be greatest, thereby allowing potential problems to be identified and addressed. Additionally, identification of the individual border crossings and gateways that could see large gains in activity can provide the impetus for states, provinces, multijurisdictional coalitions, and the region's railroads to work together to address potential chokepoints and to maintain the safety and efficiency of cross-border rail flows.

4.1 Cross-Border Rail Freight Flow Forecast Database Development

The following sections detail the procedure used to develop the forecast of cross-border rail freight flows. Like all forecasts, the forecasts developed for this project involve implicit assumptions about future events that may or may not occur. These assumptions are explained, as are the various steps taken to refine the data to facilitate forecast development.

The base year EBTC Cross-Border Rail TRANSEARCH database included information describing commodities (by STCC code), tonnage, origin and destination markets, and mode of transport. The database used in the base year analysis included origin and destination of cross-border rail flows by U.S. county and Canadian province at the two-digit STCC commodity detail; crossing detail (i.e., the county where the rail freight crossed the Canada-U.S. border); commodity weight (in U.S. short tons); and commodity value (U.S. dollars).

[11] U.S. Bureau of Transportation Statistics, 2003.

Growth and change in commodity flow patterns are closely related to changes in economic, trade, and industry growth patterns. Changes in these economic and industry characteristics can be quantified and used to predict changes in commodity movements. Because the long-term economic forecasts required for this type of forecast are expensive to develop or purchase, the cross-border rail flow forecast developed for this project was based on forecasts already produced by the FHWA Freight Analysis Framework (FAF) project.

As described previously, the FAF was an effort of FHWA in 1998 as part of a program to better understand the magnitude and geography of freight moving within the United States; analyze changes in freight flows and networks; highlight mismatches in national and regional freight demand and supply; and understand the regional significance of freight corridors and nodes. As the FAF used commodity flow data derived from Reebie Associates' TRANSEARCH database, it provides commodity flows at a similar level of commodity detail and in the same format as the base year EBTC Cross-Border Rail TRANSEARCH data used in the base year commodity flow analysis. FAF data provide flows of specific commodities by mode (truck, rail, air, and water) for a base year (1998) and forecasts of freight movement by mode for 2010 and 2020. Forecasted freight movements were developed using output projections for several specific industries. While the FAF data do not provide the level of geographic detail useful for detailed regional, statewide, or metropolitan freight planning, they can be useful in identifying key transportation corridors and how those corridors can be expected to grow in the future. Additional details about the FAF, including the methodology and assumptions used in the forecast development, are available from FHWA's Office of Freight Management and Operations.

Identification of Forecast Flows in the Region

The FAF provides commodity flow data for both Canada and the United States, using STCC codes. The FAF dataset provides only a country level of detail for imports and exports, which is combined with the direction of the freight flow (U.S. import or export) for each individual record. Some degree of origin and destination information exists within the dataset, including the destination states for U.S. imports from Canada and the state of origin for U.S. exports to Canada.

To facilitate forecast development, a number of assumptions were made about the scope, scale, and level of detail of the FAF forecast. First, it was assumed that the dataset captured 100 percent of the U.S.-Canada cross-border freight flows. Second, it was assumed that shipments were not processed or repackaged at any point between origins and destinations. In other words, a shipment from Vermont to Quebec was assumed to not have used any railroad other than that required for the specified trip. For some commodities and/or shipments, some degree of repackaging might occur, so actual railroad utilization may be somewhat under-projected. Finally, it was assumed that freight was shipped in the most efficient manner, and as such goods crossing at a Maine-Quebec border crossing were not bound for Ontario.

Since the FAF dataset includes commodity flows across all modes for all 50 U.S. states and the District of Columbia, it was necessary to pare down the full dataset in order to develop the forecast for the EBTC region. As previously described, the publicly available FAF dataset details commodity flows by highway, rail, water, and air, for 1998, 2010, and 2020. The database was stripped down to include only those records that listed flows between Canada and the United States by rail. This left almost 3,000 records in the database, which were further subdivided by direction of freight movement.

Assignment of Value Detail to Forecast Flows

Since the FAF dataset does not include a value component, it was necessary to assign values that would reflect the worth of each shipment. While the FAF database provides commodity information at the two-digit STCC level, commodities were assigned to commodity groups based on the SCTG system for analysis, to ensure consistency with the base year commodity flow analysis and the *Truck Freight Crossing the Canada-U.S. Border* study completed by the EBTC in 2002. These commodity groups were described in the previous section.

The TRANSEARCH database used in the analysis of base year cross-border rail flows contained information on commodity values. As such, the average value per ton for each commodity classification was derived from that analysis. Different values were assigned to goods leaving the United States for Canada and vice versa in order to reflect the different market prices paid for each good class within each country; to reflect the different commodities included within each commodity group; and to ensure consistency with the base year commodity flow analysis. It was assumed that the dollar value per ton of each good would remain unchanged in 2020. Since the forecast was to utilize the same year dollar values as the present year analysis, no adjustment for inflation was made to the value of each commodity group.

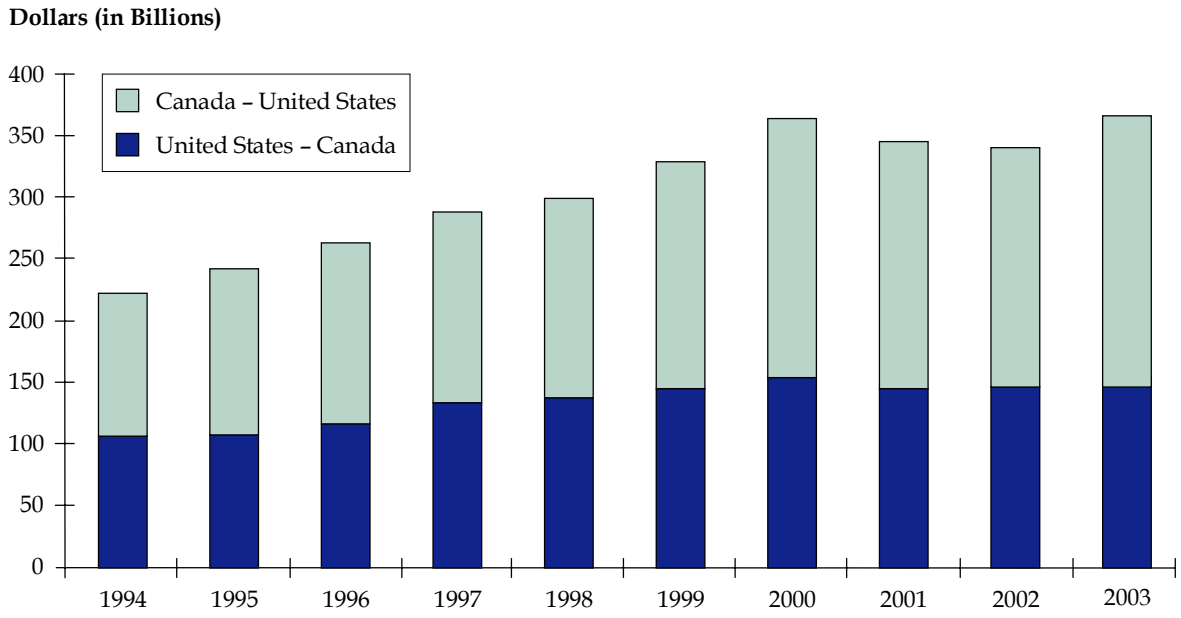
Development of "High" and "Low" Forecasts

Like all forecasts, the forecasts developed for this project involve implicit assumptions about future events that may or may not occur. For these reasons, two rail flow projections were developed: one based on an aggressive (high-growth) and the other on a conservative (low-growth) economic forecast. The high-growth and low-growth scenarios were developed by analyzing historical U.S.-Canada trade trends; growth patterns of the United States and Canadian economies; and the forecasts developed as part of the FAF.

U.S.-Canada Trade Trends

Understanding historical trade trends can provide insights as to the what level of trade can be expected in the future. Total U.S.-Canada trade expanded by 1.23 percent annually between 1994 and 2003, while total U.S. imports and exports grew by an average of 1.6 percent over the same period.[12] As shown in Figure 4.1, while the value of all surface trade with Canada dropped between 2000 and 2002, it has since rebounded to pre-9/11 levels. Figure 4.2 shows U.S.-Canada trade by rail, which experienced a similar drop from 2000 to 2001, but also rebounded in 2003. It is interesting to note that while the total value of goods transported between the United States and Canada dropped between 2001 and 2002, the value of goods transported by rail increased slightly. In 2003, over 77 percent of the value of goods transported by rail flowed from Canada into the United States.

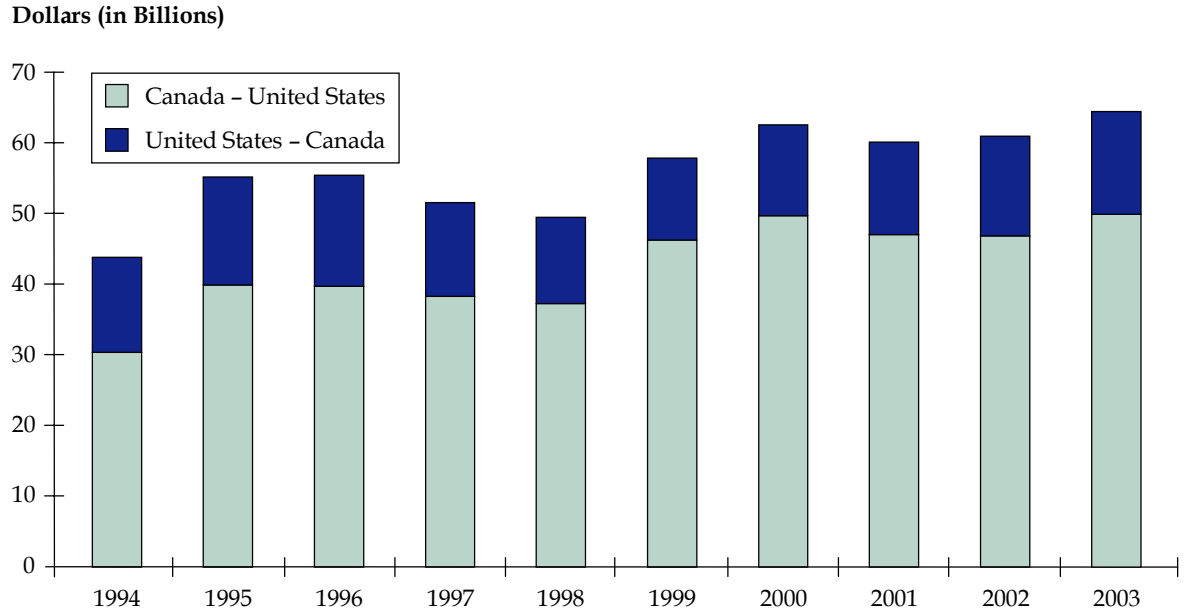
Figure 4.1 Combined Surface Trade between the United States and Canada
U.S. Dollars



Source: U.S. Department of Transportation, Bureau of Transportation Statistics, and Transborder Surface Freight Data.

[12]U.S. Department of Commerce.

Figure 4.2 Combined Rail Trade between the United States and Canada
U.S. Dollars

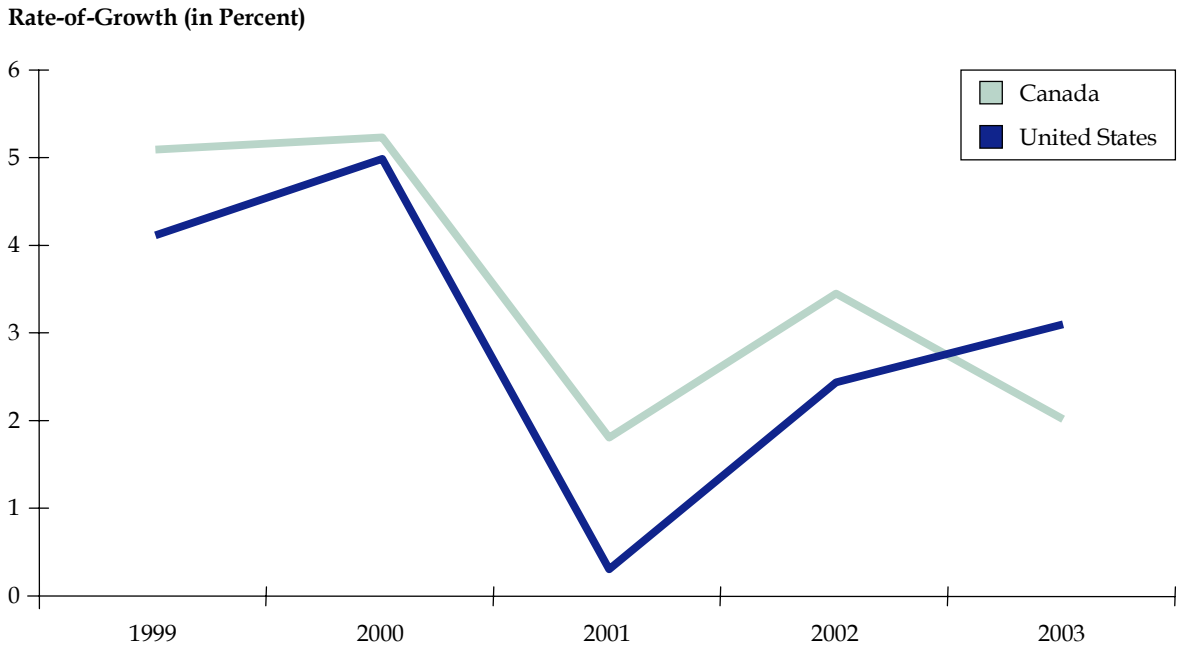


Source: U.S. Department of Transportation, Bureau of Transportation Statistics, and Transborder Surface Freight Data.

U.S./Canada Economy Growth Patterns

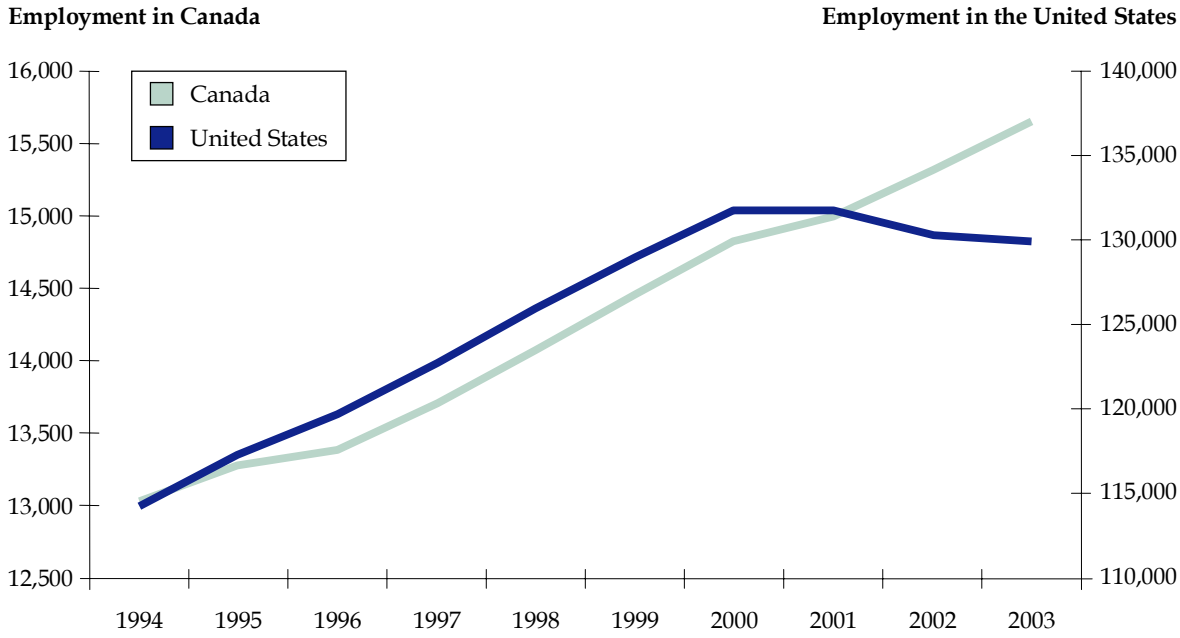
Gross domestic product (GDP) is the value of all goods and services produced in a country and is commonly used as the basis for comparing the overall economic size and output of regions, states, provinces, and countries. Figure 4.3 illustrates the change in the GDP growth rate in both Canada and the United States between 1998 and 2003. While the fortunes of the two nations appear to be closely related, Canada has generally experienced greater growth than the United States until recently. While both nations experienced significant decreases in their GDP between 2000 and 2001, neither country has experienced negative growth in its GDP. As shown in Figure 4.4, U.S. employment has increased at approximately a 0.6 percent compound annual rate since 1998, while Canada has increased at a rate of 2.2 percent over the same period. While employment in Canada has consistently increased since 1994, U.S. employment peaked in 2001.

Figure 4.3 Growth Rate of Gross Domestic Product in the United States and Canada



Source: Statistics Canada and United States Census.

Figure 4.4 Historical Employment Levels in the United States and Canada



Source: United States Department of Labor Bureau of Labor Statistics.

FAF Forecasts

As discussed earlier, the EBTC cross-border rail forecast developed for this project was based on forecasts already produced as part of the FAF. The FAF dataset forecasts trade flows for the years 2010 and 2020. These forecasts are based on a combination of 1998 county-to-county freight transportation flows and 2000 long-term economic forecasts. The FAF forecasts were developed in 1998 following a period of strong economic and trade growth and do not reflect the 2001 to 2002 economic downturn nor the impacts of new security requirements instituted in the wake of 9/11.

In contrast to the trade and economic trends discussed to this point, the FAF forecast through 2020 for U.S. exports and imports to and from Canada – annual growth rates of 2.49 percent and 2.86 percent, respectively – now seem aggressive. For this reason, the FAF figures were used as a "high" forecast and the average growth rate of U.S.-Canadian trade over the past five years as a "low" forecast to estimate trade levels in the EBTC region through 2020. The FAF forecast was chosen as the high forecast because it is unlikely that both the United States and Canadian economies will perform better than was projected by the FAF, while the slow growth during the recent economic downturn is likely to be the a truer representation of the lower bounds of potential economic growth. As such, the high and low projections serve as the upper and lower bounds of future economic performance, with the true results likely falling somewhere between the two.

Summary

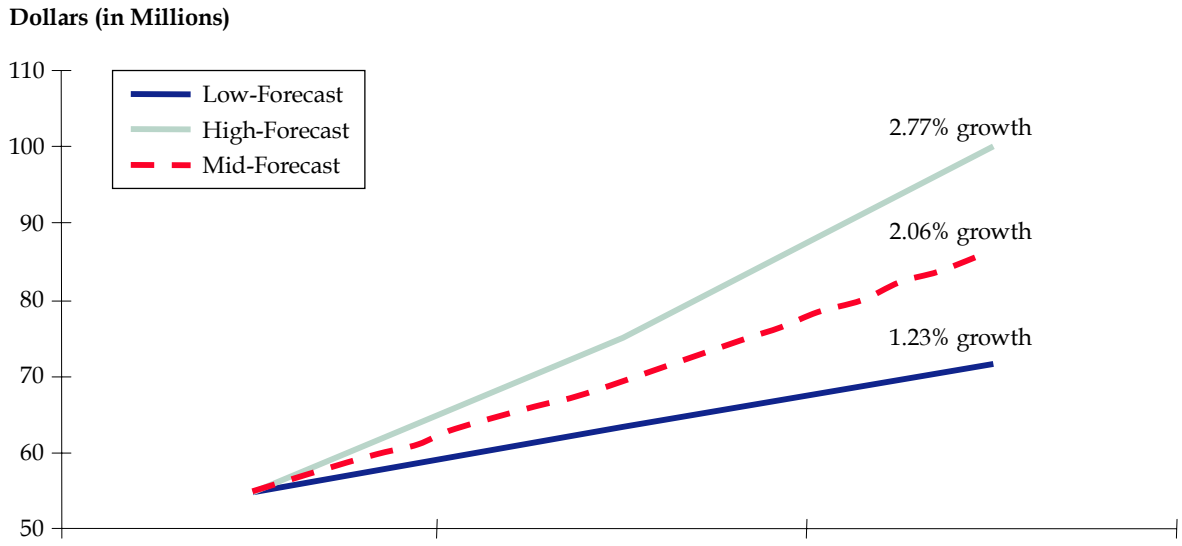
An analysis of the historic trend of several economic factors gives credence to the belief that the 2020 FAF forecast was too aggressive. While the flow of freight detailed in the FAF may be unattainable given current economic conditions, it does represent a potential upper-bound for future freight movement. The survey of historical performance indicated that a more conservative forecast would reflect more accurately the likely future performance of freight flow between the United States and Canada (see Table 4.1). Since trade between the two nations grew at a compound annual growth rate of 1.23 percent between 1998 and 2003, a period of economic downturn, this value was determined as being a suitable value for the lower bounds of future growth. In all likelihood, future growth will occur somewhere between the two values used, as shown in Figure 4.5.

Table 4.1 Comparison of United States and Canada Growth Statistics with FAF Forecast Growth Rate

Source	1998-2003	1998-2020
U.S. Employment	0.63%	-
Canadian Employment	2.17%	-
Real GDP Growth in the United States	2.75%	-
Real GDP Growth in Canada	3.53%	-
Real Growth in Value for Canadian-U.S. Trade	1.23%	-
FAF – Flow of Goods from Canada to the United States	-	2.86%
FAF – Flow of Goods from the United States to Canada	-	2.49%

Figure 4.5 Comparison of Forecasts of Projected Growth of Combined Rail Trade between the United States and Canada

U.S. Dollars



4.2 Assignment of Rail Traffic to Gateways

As previously noted, the FAF dataset used as the basis for the EBTC cross-border rail forecast only details the origin nation for U.S. imports and the destination nation for U.S. exports. Within the FAF dataset, origins or destinations of goods outside of the United States are recorded as the state at which the goods left or entered the country. For example, shipments of granite from Quebec to Ohio are detailed as an import from Canada with an origin in New York (reflecting that the goods entered the United States in New York) and a destination in Ohio. It was therefore necessary to assign the shipments to the same gateways described in Section 3.0.

Several assumptions exist with respect to the assignment of goods to gateways. As indicated above, the FAF dataset only provides detail at a state-to-state level, with one of the pairs representing the origin or destination state (with respect to point of entry from or exit to Canada). Three key assumptions exist when implementing such a calculation. First, that the current flow of goods will commence from the same origins and head to the same destinations, and that no new sources or terminal points will appear. Second, that the same carriers will exist, with no new businesses appearing along different routes. And third, that there will be no significant infrastructure investment or operational improvements at any one border crossing that would divert current usage away from another crossing.

The assignment of goods to gateways was performed using an extrapolation of the base year commodity flow analysis. This was accomplished by mapping each base year commodity record by state to a province by gateway (and vice versa for flows in the other direction). The gross weight of each commodity that passed through each gateway was converted into a percentage, which could then be applied to develop the future year forecasts. This methodology resulted in the projection of the weight of each commodity leaving each state destined for any given province through any given gateway (and vice versa).

4.3 Forecast Cross-Border Rail Freight Flows

The previous sections detailed how the cross-border rail forecast was developed. This section provides a summary of projected cross-border rail flows originating, terminating, or crossing the U.S.-Canada border within the EBTC region. This quantitative commodity flow forecast will provide the means to better understand the level of future rail trade between the United States and Canada.

The forecast calls for over 153.5 million tons of rail freight to cross the U.S.-Canada border in 2020, approximately 65.1 percent of which will originate, terminate, or cross the border within the EBTC region. This represents a slight increase in the EBTC region's share of cross-border rail movements (62.5 percent in 2001). Table 4.2 shows the total projected trade within the EBTC region by rail, estimated at almost 100 million tons with a combined value of approximately $129.7 billion (U.S. dollars) in the high forecast. This

decreases to 71.8 million tons and $93.5 billion in the low forecast. Figures 4.6 and 4.7, displaying U.S.-Canada and Canada-U.S. flows by weight and value, respectively, show that approximately 75 percent of cross-border EBTC trade would originate in Canada. The forecast levels represent a 31 percent increase over 2001 trade levels under the low scenario, or an 82 percent increase under the high scenario.

Table 4.2 Total U.S.-Canada Rail Trade within the EBTC Region

	Weight (Tons)		Value (Millions of U.S. Dollars)	
	Low Forecast	High Forecast	Low Forecast	High Forecast
Canada-U.S.	53,007,600	75,379,707	$64,603.9	$91,870.3
U.S.-Canada	18,746,776	24,588,794	$28,849.7	$37,840.1
Total	**71,754,376**	**99,968,501**	**$93,453.6**	**$129,710.4**

Figure 4.6 Total Projected EBTC Trade by Weight

High- and Low-Growth Forecasts

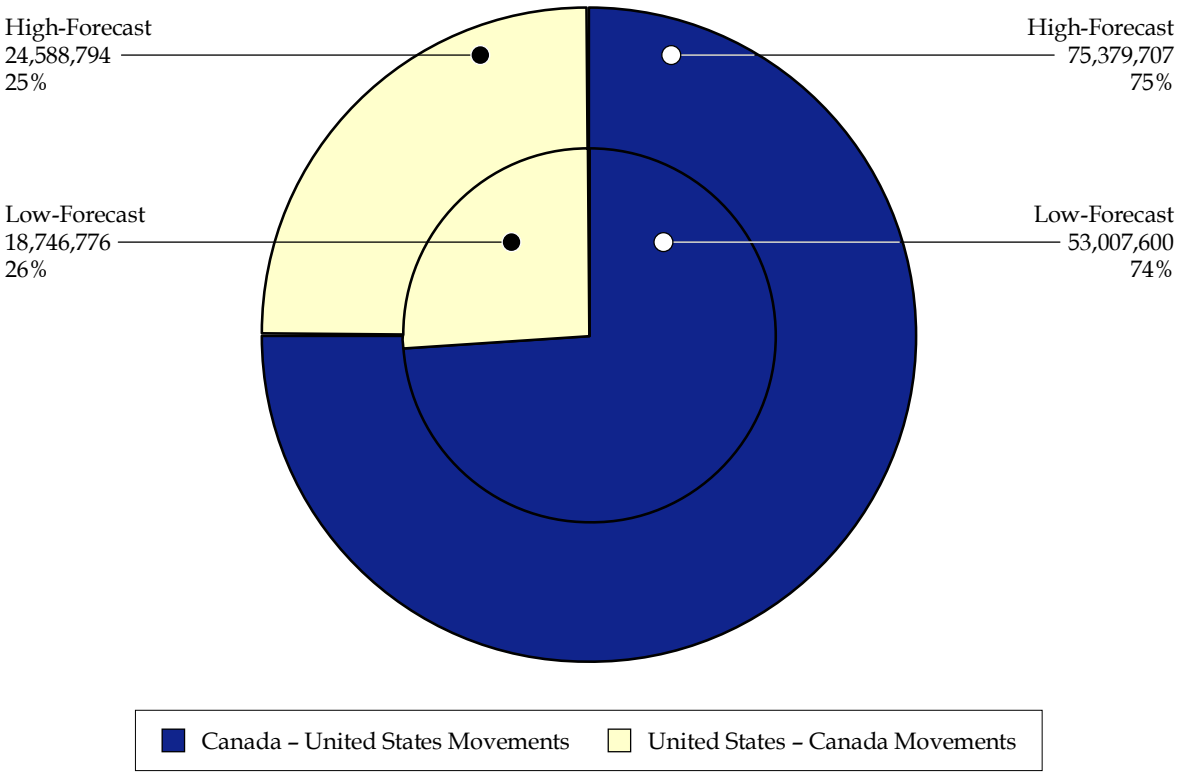
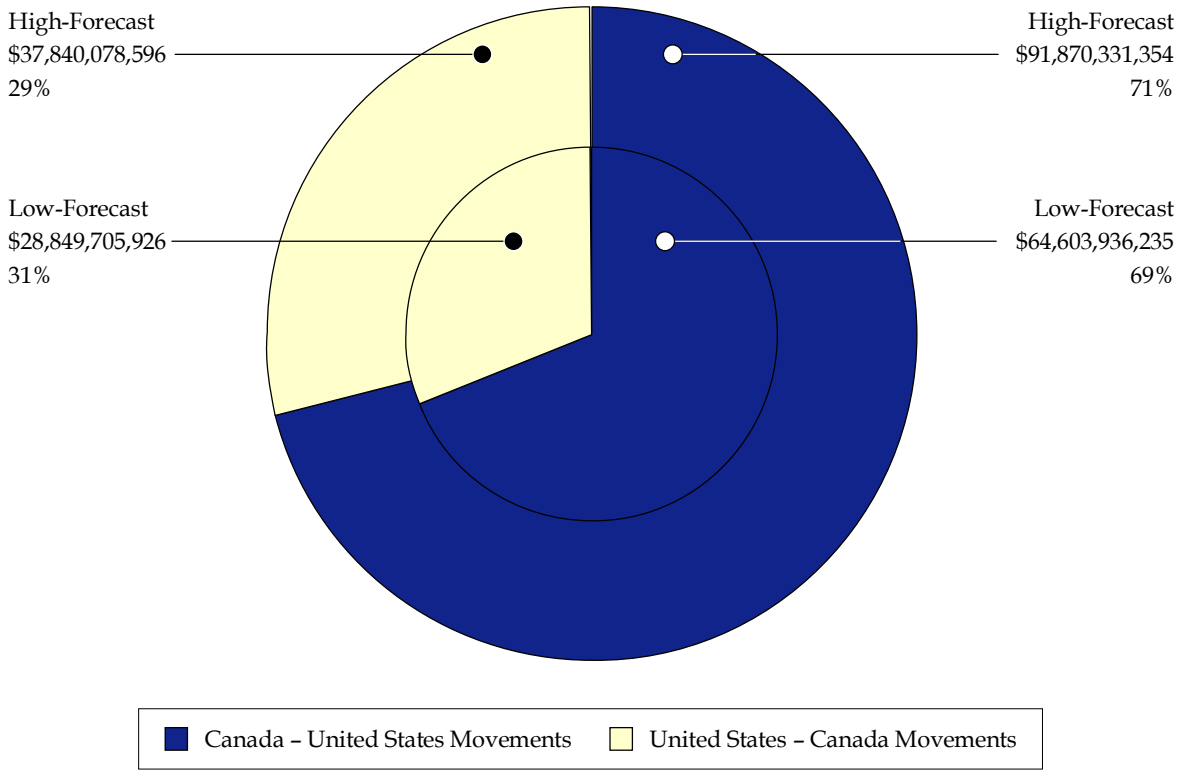


Figure 4.7 Total Projected EBTC Trade by Value
High- and Low-Growth Forecasts (U.S. Dollars)



Top Commodities

It is important to understand how the types of commodities being moved along the EBTC region's rail infrastructure could change in the future in order to understand which industries are using the region's rail system. Forecast commodity flows were analyzed and reported by both weight (in U.S. short tons) and value (U.S. dollars). Figure 4.8 shows the breakdown of commodities for the projected EBTC cross-border rail traffic in both directions by weight. The top four commodity groups would account for 73 percent of the total flows by weight, or 72.7 million tons. These commodity groups would consist of wood products, textiles, and leather (25 percent); pharmaceutical and chemical products (25 percent); stone, minerals, and ores (12 percent); and electronics, vehicles, and precision goods (11 percent). As these same commodity groups accounted for 77 percent of the total flows by weight, or 45.6 million tons in 2001, it appears as if U.S.-Canada cross-border rail trade can be expected to diversify slightly in terms of the weight of cross-border rail shipments.

Figure 4.8 Overall Projected EBTC Top Commodities by Weight
High-Growth Forecast

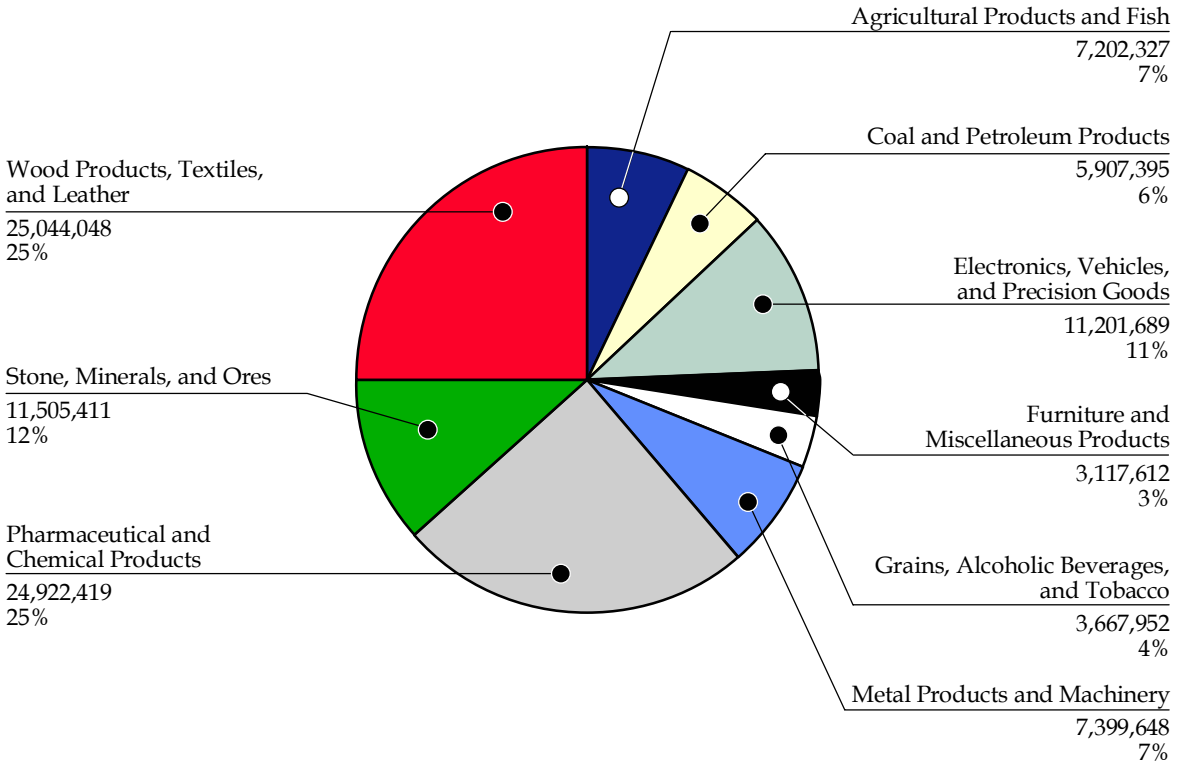
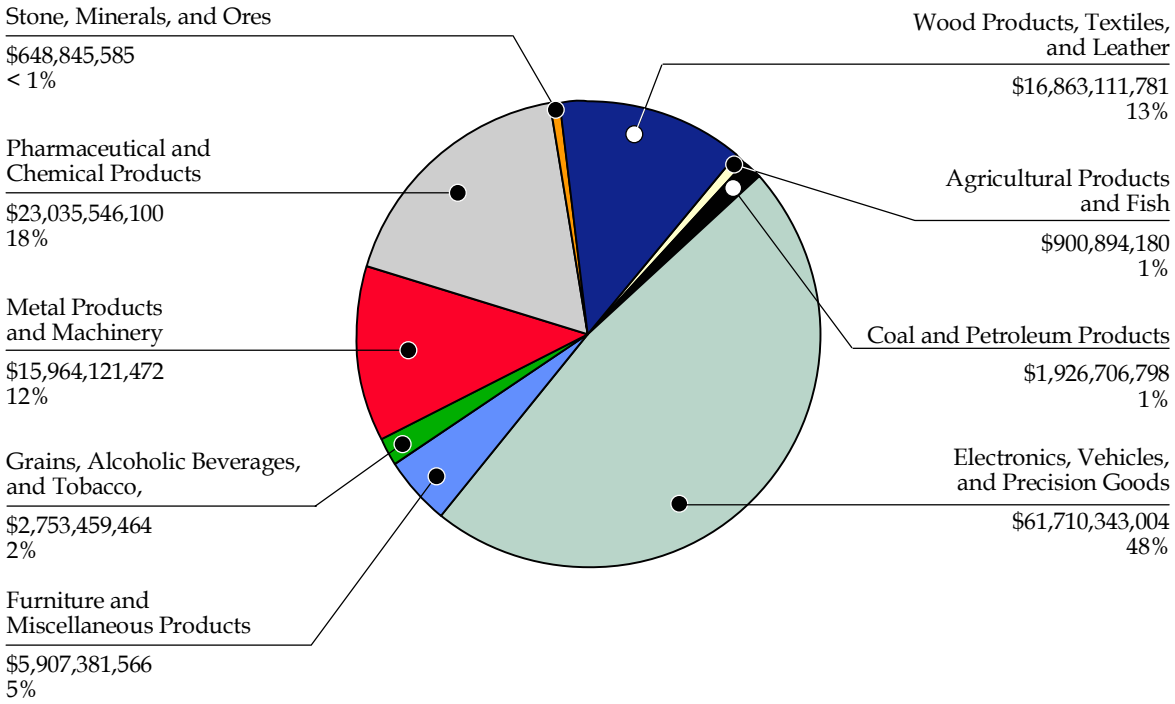


Figure 4.9 shows the breakdown of commodities for the projected EBTC cross-border rail traffic in both directions by value. The top four commodity groups would account for approximately 91 percent of the total flows by value, or $117.6 billion (U.S. dollars). In 2001, these same four commodity groups accounted for $61.6 billion (U.S. dollars), which represented 86 percent of the total flows by value. These commodity groups would consist of electronics, vehicles, and precision goods (48 percent); pharmaceutical and chemical products (18 percent); wood products, textiles, and leather (13 percent); and furniture and miscellaneous products (five percent). This finding highlights the importance of rail freight to the automotive industry, which will comprise a significant portion of the $61.7 billion (U.S. dollars) worth of the electronics, vehicles, and precision goods that are projected to be transported within the EBTC region. It also indicates that U.S.-Canada cross-border rail trade (by value) will be increasingly driven by just a handful of commodities.

Figure 4.9 Overall Projected EBTC Top Commodities by Value
High-Growth Forecast (U.S. Dollars)



Figures 4.10 and 4.11 show forecasts of the top commodities by weight and value for U.S.-Canada movements and Canada-U.S. movements. From the charts it is clear that the United States is projected to continue to be a net importer of cross-border rail freight, particularly for wood products, textiles, and leather; pharmaceutical and chemical products; and metal products and machinery. Under the high-growth scenario, wood products, textiles, and leather are projected to account for just over 25 million tons of cross-border trade in 2020, while pharmaceutical and chemical products will account for just under 25 million tons. Both drop to under 18 million tons in the low-growth forecast. When the dollar value of trade is examined, the forecasted level of electronics, vehicles, and precision goods that cross the border stands at over $60 billion under the high-growth scenario and just under $45 billion under the low-growth scenario. This is almost three times the value of the next highest category of goods – pharmaceutical and chemical products.

Figure 4.10 Projected Trade Balance by Key Commodities by Weight
High-Growth Forecast

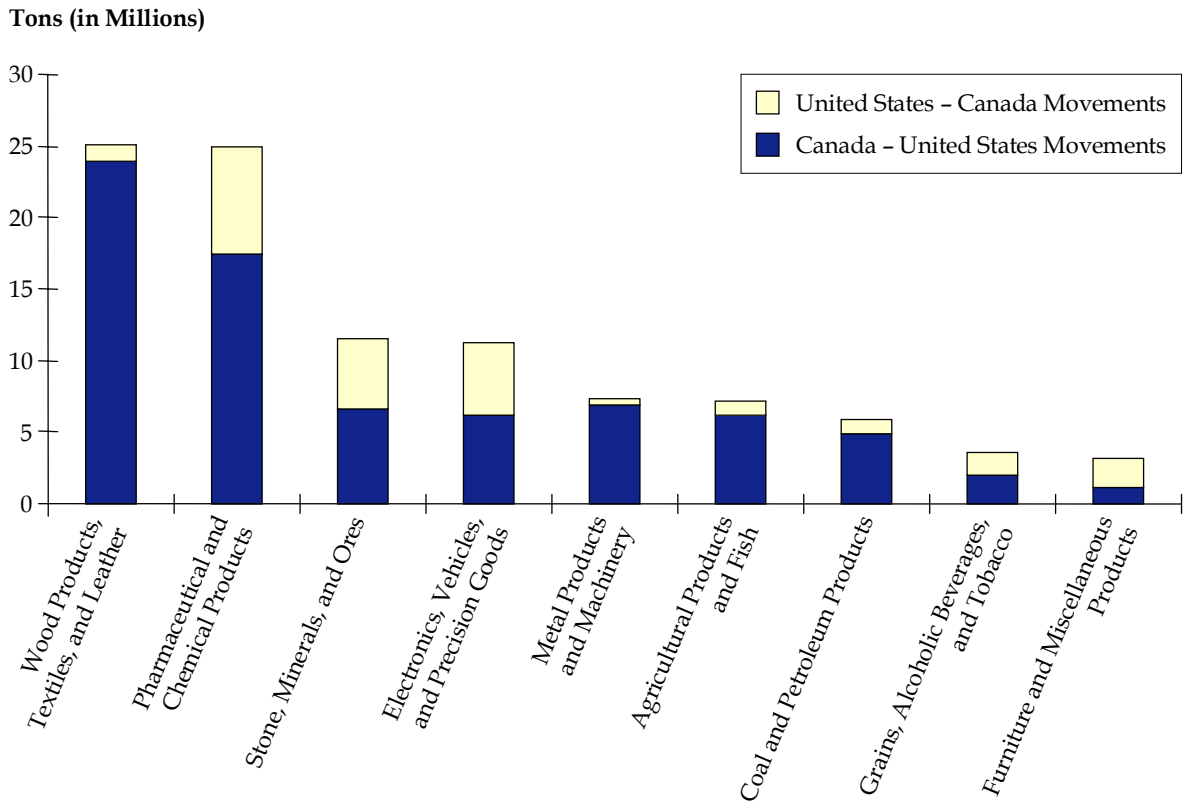
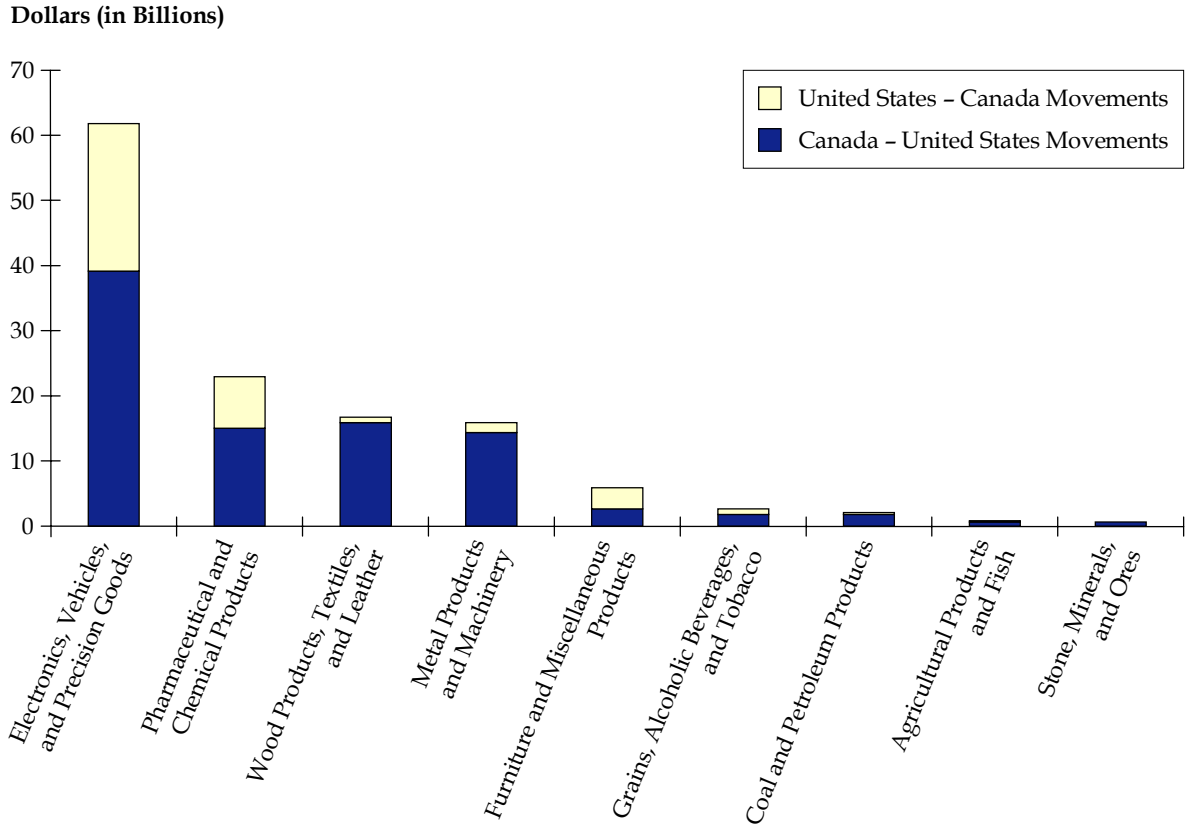


Figure 4.11 Projected Trade Balance by Key Commodities by Value
High-Growth Forecast (U.S. Dollars)



Gateways

Figures 4.12 and 4.13 show the forecast total cross-border rail flows by weight and value across each of the gateways in the EBTC region. As can be seen, cross-border rail flows are forecast to continue to be dominated by the two Detroit gateways, the Detroit-Windsor and St. Clair River Tunnels, which together are projected to handle 43.7 percent of the weight (an increase from 36.8 percent in 1998) and 60.0 percent of the value (up from 58.5 percent) of all cross-border rail flows originating, terminating, or crossing the northern border within the EBTC region. In fact, as shown in Figures 4.14 and 4.15, the Michigan-Ontario gateways combined are forecast to handle 53 percent of the total weight (an increase from 39 percent in 1998) and 61 percent of the total value (a one percent drop) of all cross-border EBTC flows. The large increase in the flow of goods by weight is caused predominantly by a substantial growth in goods leaving Ontario rather than Michigan. The Niagara-Buffalo gateway, which handles a significant amount of consumer goods, such as electronics, furniture, and machinery; and the International Falls Bridge, which handles a significant amount of stone and ore, wood and lumber, and petroleum products also are projected to continue to be high-volume gateways.

Figure 4.12 Projected Cross-Border Rail Flows by Gateway by Weight
High-Growth Forecast

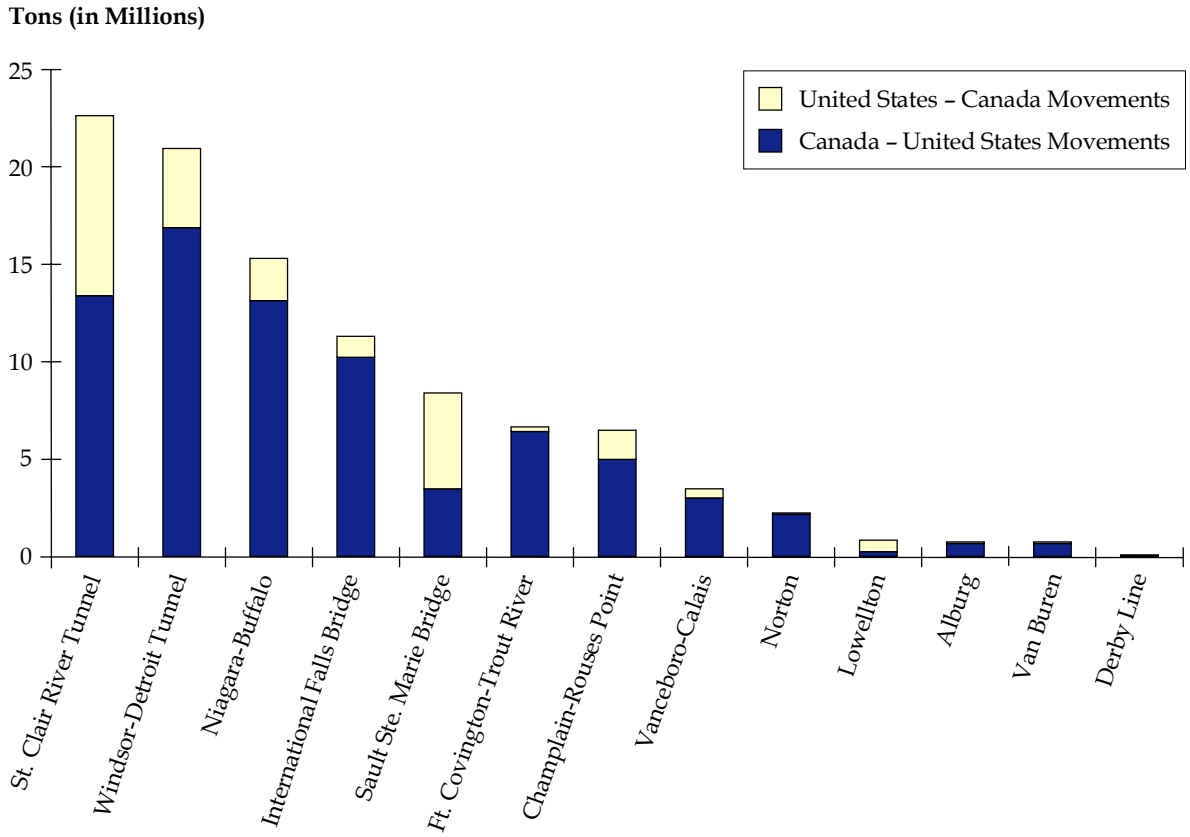


Figure 4.13 Projected Cross-Border Rail Flows by Gateway by Value
High-Growth Forecast (U.S. Dollars)

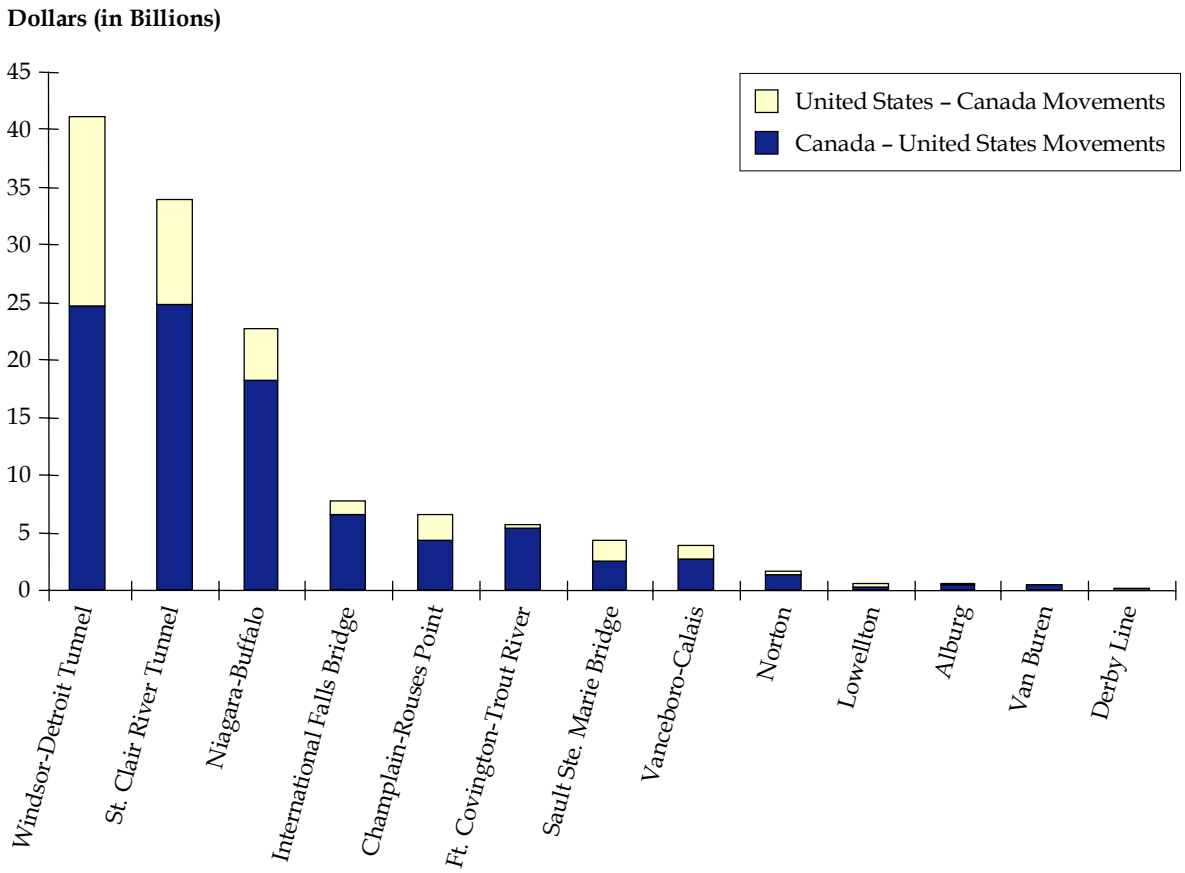


Figure 4.14 Projected State-Province Gateways by Weight

High-Growth Forecast

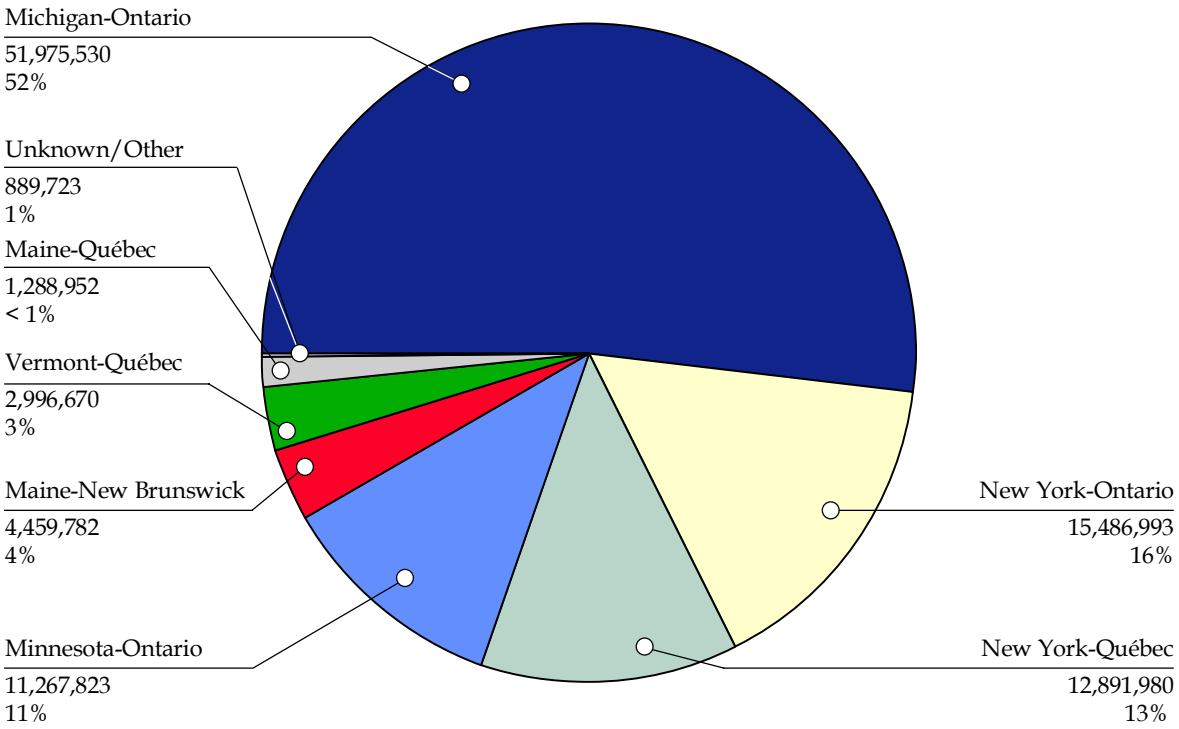
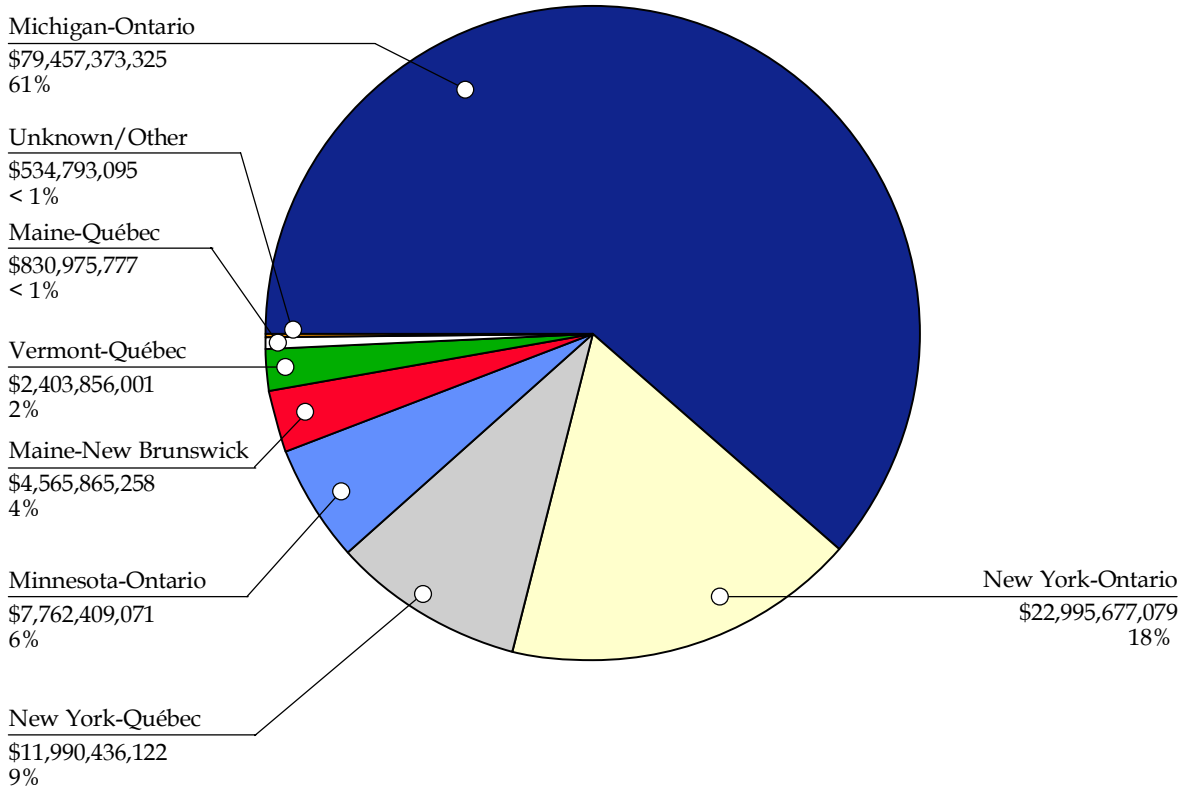


Figure 4.15 Projected State-Province Gateways by Value
High-Growth Forecast (U.S. Dollars)



Trading Partners and Patterns

Figures 4.16 and 4.17 show the projected distribution of cross-border rail trade that originates, terminates, or crosses the border through the EBTC region, by weight and value respectively. Almost three quarters of cross-border rail trips in the region based on weight are forecast to have origins or destinations away from the border, a slight decrease from 2001. When the value of goods is projected, the share is similar to that measured in 2001, with just over 20 percent of the goods having either origins or destinations at a border state. This is primarily due to the nature of rail freight movements, which typically provide the long-haul (greater than 500 miles) portion of an intermodal movement.

Figure 4.16 Projected EBTC Cross-Border Rail Trade by Weight
High- and Low-Growth Forecasts

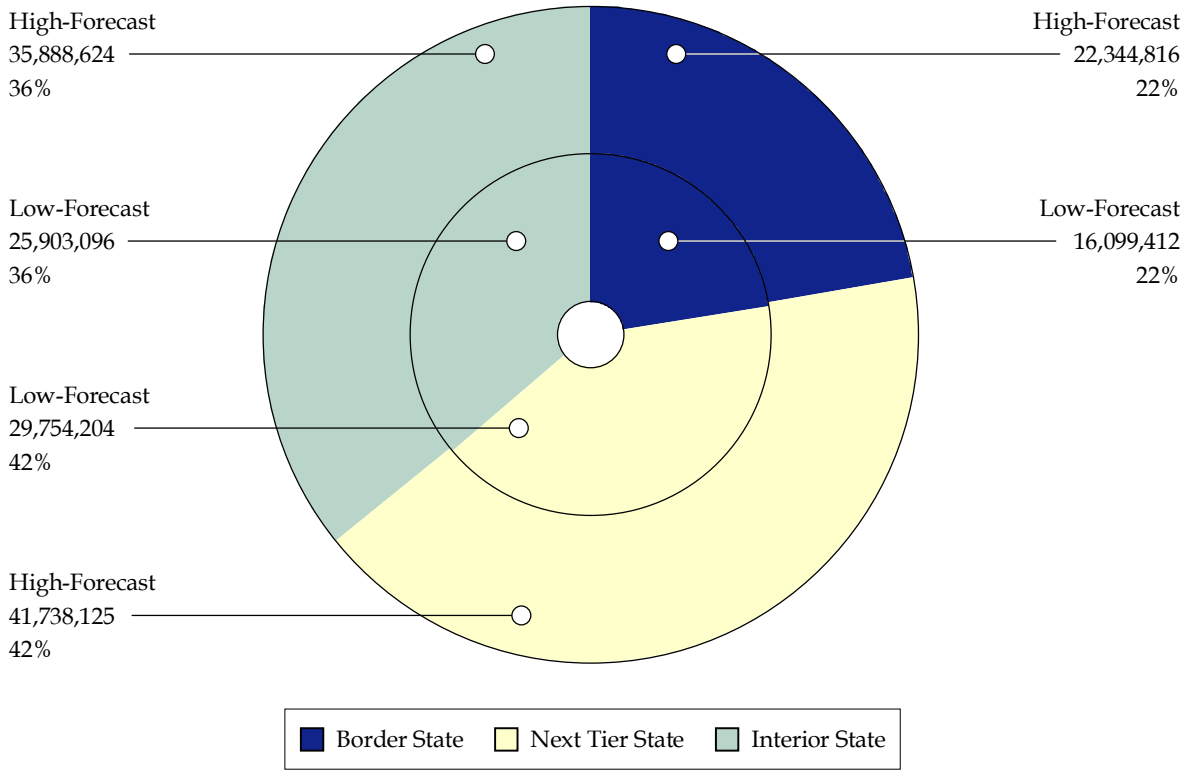
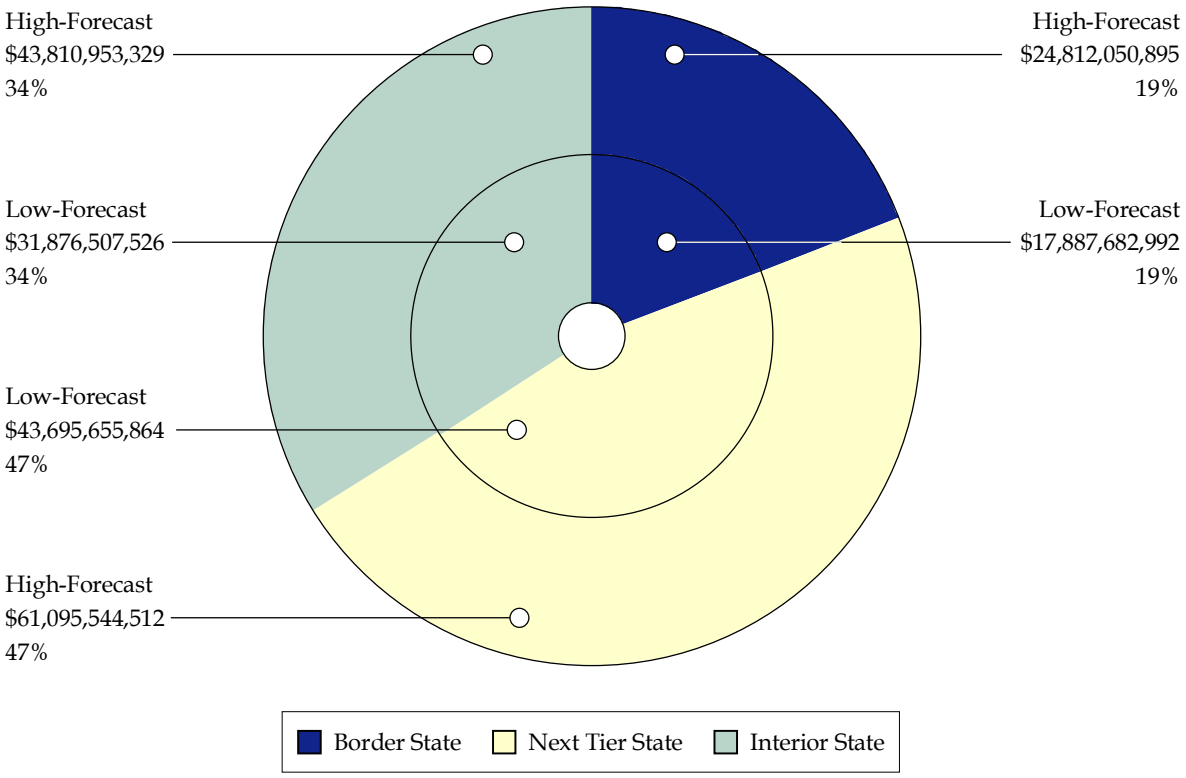


Figure 4.17 Projected EBTC Cross-Border Rail Trade by Value
High- and Low-Growth Forecasts (U.S. Dollars)



Figures 4.18 and 4.19 show the projected balance of rail trade by state. Clearly, non-border states are impacted by cross-border rail flows between Canada and the United States. The same 17 non-border states that were responsible for producing 56 percent of the goods that flowed into Canada by truck and 40 percent of the goods that entered the United States by truck also play a major role in rail-freight movement.[13] These states accounted for 66 percent of the weight and 71 percent of the value of United States-bound rail movements, and 52 percent of the weight and 63 percent of the value of Canada-bound rail movements in 2020.

[13] EBTC, *Truck Freight Crossing the Canada-U.S. Border* study, 2002.

Figure 4.18 Projected Balance of Trade by U.S. States by Weight
High-Growth Forecast

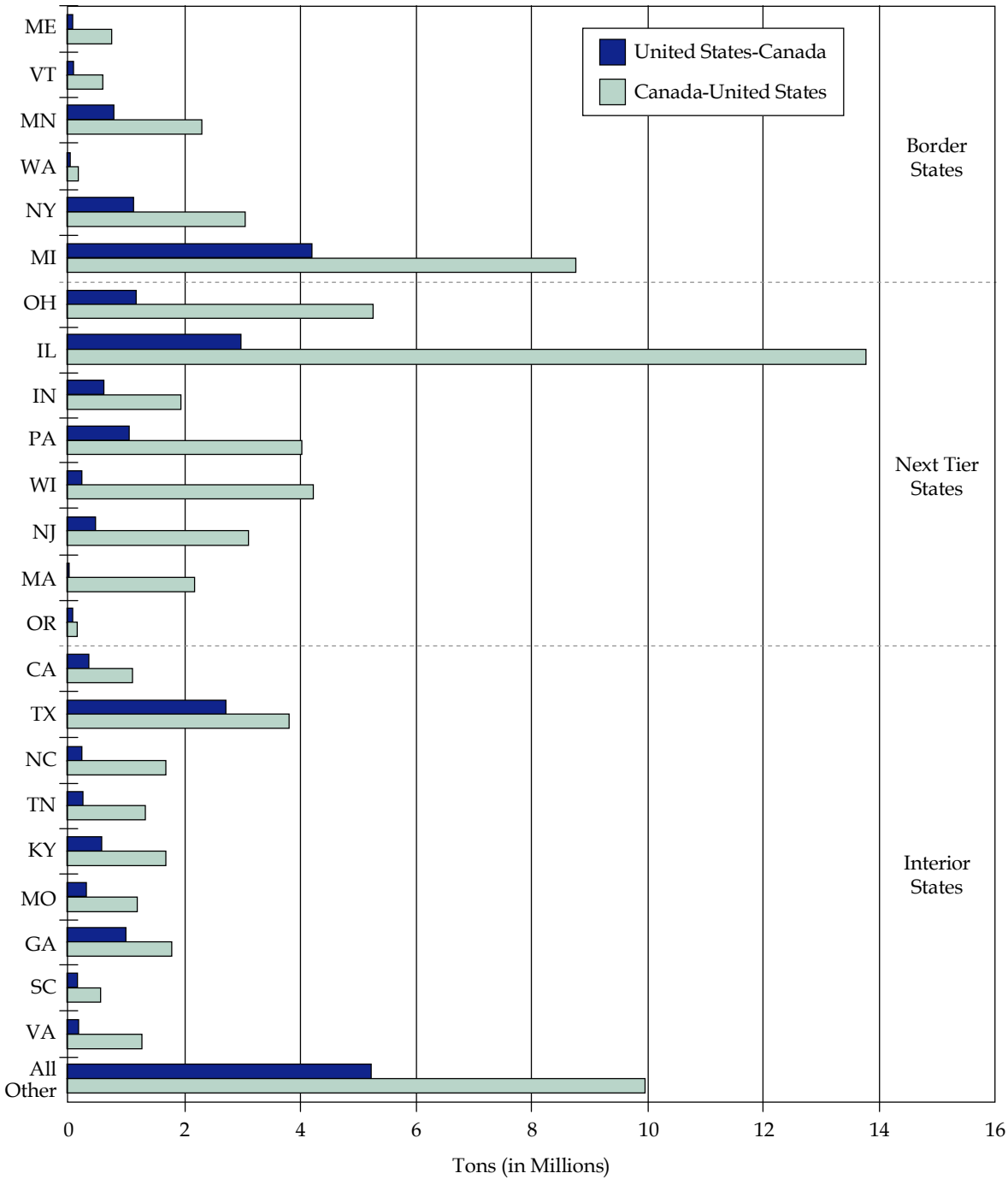
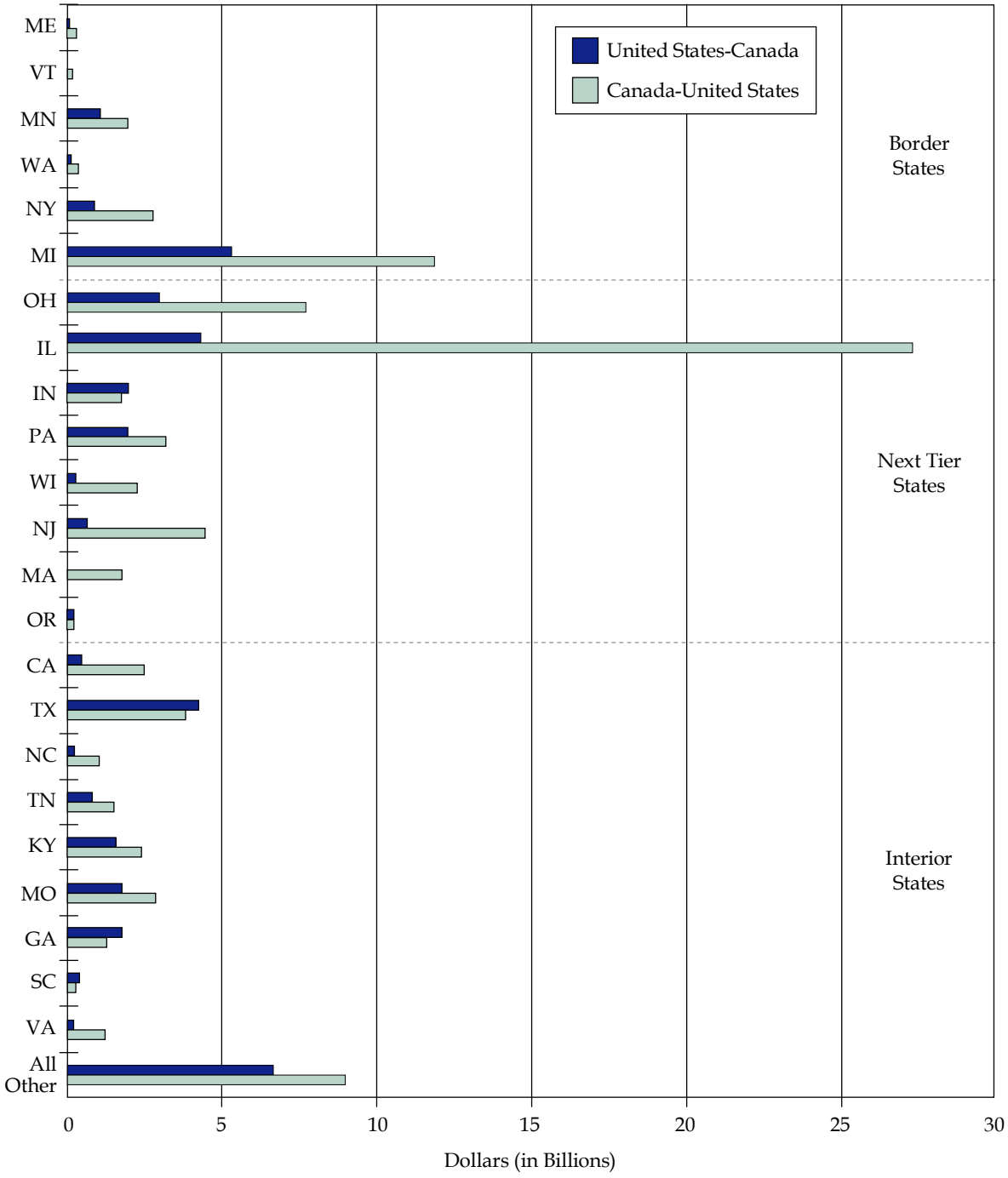


Figure 4.19 Projected Balance of Trade by U.S. States by Value
High-Growth Forecast



Key Findings

The main findings of the analysis of forecast cross-border rail flows originating, terminating, or crossing the northern border within the EBTC region, include:

- Over 153.5 million tons of rail freight is projected to cross the entire U.S.–Canada border in 2020, approximately 65.1 percent of which is anticipated to originate, terminate, or cross the border within the EBTC region.

- The United States will continue to be a net importer of cross-border rail trade from Canada, particularly for wood products, textiles, and leather; pharmaceutical and chemical products; and metal products and machinery. Trade between the United States and Canada is projected to become relatively balanced in electronics, vehicles, and precision goods, which was not the case in 2001, though overall Canada-U.S. trade will be driven by this small handful of commodities. Approximately three-quarters of total EBTC cross-border rail flows will continue to originate in Canada.

- The impacts of cross-border rail traffic will not be limited to the EBTC's rail network, as cross-border rail traffic will continue to have origins and destinations both within and outside the EBTC region. In fact, approximately 12.5 percent of the total weight and 20 percent of the total value of EBTC cross-border rail is projected to continue to flow through Chicago (where it is likely reclassified and shipped to more distant markets).

- Key commodities under the high-growth forecast scenario for cross-border rail traffic (by weight) include wood products, textiles, and leather (25 percent, down from 26 percent in 2001); pharmaceutical and chemical products (25 percent, up one percent); stone, minerals, and ores (12 percent, down from 17 percent); and electronics, vehicles, and precision goods (11 percent, a one percent increase). Combined, these top four commodity groups will likely account for 73 percent of the total flows by weight, or 72.7 million tons.

- Key commodities for cross-border rail traffic by value under the high-growth scenario are forecast to include electronics, vehicles, and precision goods (47 percent, up from 40 percent in 2001); pharmaceutical and chemical products (18 percent, constant with 1998 levels); wood products, textiles, and leather (13 percent, down two percent); and furniture and miscellaneous products (five percent, down from 14 percent). These top four commodity groups accounted for approximately 83 percent of the total flows by value, or $117.6 billion (U.S. dollars). This finding highlights the continued importance of rail freight to the automotive industry, which is projected to transport approximately $61.7 billion (U.S. dollars) worth of finished and partially finished automobiles and parts by rail within the EBTC region each year.

- Cross-border rail flows will continue to be dominated by the two Detroit crossings, the Detroit-Windsor and St. Clair River Tunnels, which combined to handle 43.7 percent of the weight and 60 percent of the value of all cross-border rail flows originating, terminating, or crossing the northern border within the EBTC region, both of which are increases from 2001 levels. The Niagara-Buffalo gateway, which handles a

significant amount of consumer goods, such as electronics, furniture, and machinery; and the International Falls Bridge, which handles a significant amount of stone and ore, wood and lumber, and petroleum products also will continue to be high-volume gateways.

- Unlike the *Truck Freight Crossing the Canada-U.S. Border* study, which showed that about 50 percent of cross-border truck trips are bound to and from border states, about three quarters of both the weight and value of cross-border rail trips in the region will continue to have origins or destinations away from the border, a slight decrease from 2001 levels.

5.0 Key Findings and Recommendations

This section summarizes the key findings of the commodity flow and forecast analyses conducted as part of this study and provides recommendations to the EBTC and its member agencies to guide future cross-border rail planning activities.

5.1 Key Findings

Key findings of the *EBTC Study of Rail Freight Crossing the Canada-U.S. Border* are provided in two areas:

- **Cross-border rail movements**, which address the volume and type of rail freight moving across the Canada-U.S. border and how those movements may change in the future; and
- **Cross-border rail data, forecasting, and mapping**, which address the ability of existing cross-border rail data to support forecasting, mapping, and other transportation planning activities conducted by states, provinces, metropolitan planning organizations, and other transportation planning organizations.

Cross-Border Rail Movements

There are several key findings of the analysis of existing cross-border rail flows originating, terminating, or crossing the northern border within the EBTC region, including:

- **Cross-border rail freight movements in the EBTC region are significant**. Over 87.6 million tons of rail freight crossed the U.S.-Canada border in 2001,[14] approximately 62.5 percent of which originated, terminated, or crossed the border within the EBTC region. Forecasts indicate that over 153.5 million tons of rail freight is projected to cross the entire U.S.–Canada border in 2020, approximately 65.1 percent of which is anticipated to originate, terminate, or cross the border within the EBTC region. This increase is being driven by growth in the electronics, vehicles, and precision goods

[14]Transport Canada, T-Facts, 2003.

industries, which are important sectors of the EBTC region's economy. While cross-border freight movements are currently dominated by trucks, which handle approximately 75 percent of U.S.-Canada trade, cross-border movements by rail are and will continue to be an important component of the transportation system and economic vitality of both the United States and Canada. It is important that cross-border rail movements and issues not be overlooked by the EBTC region's transportation planning agencies when they conduct transportation planning activities.

- **Non-border states are the origins or destinations of a significant percentage of cross-border rail trade**. Over 80 percent of both the weight and value of cross-border rail trips in the region have origins or destinations away from the border. In fact, 17 non-border states (Ohio, Illinois, Indiana, Pennsylvania, Wisconsin, New Jersey, Massachusetts, Oregon, California, Texas, North Carolina, Tennessee, Kentucky, Missouri, Georgia, South Carolina, and Virginia) account for 66 percent of the weight and 71 percent of the value of United States-bound rail movements; and 52 percent of the weight and 63 percent of the value of Canada-bound rail movements. This is primarily due to the nature of rail freight movements, which typically provide the long-haul (greater than 500 miles) portion of an intermodal movement. As a result of these trading patterns, rail traffic crossing the border in the EBTC region not only has an impact on EBTC member agencies, but also on rail networks across North America. In fact, approximately 12.5 percent of the total weight and 20 percent of the total value of EBTC cross-border rail flows travel through Chicago, Illinois (where it is likely reclassified and shipped to more distant markets). This detail further emphasizes one of the key findings of the *EBTC Study of Truck Freight Crossing the Canada-U.S. Border*. Namely, cross-border trade and transportation has impacts and benefits to the transportation systems and economic vitality of all states, not just those located along the northern border.

- **A handful of commodity groups drives cross-border trade**. The top four commodity groups by weight (wood products, textiles, and leather; pharmaceutical and chemical products; stone, minerals, and ores; and electronics, vehicles, and precision goods) accounted for 77 percent of the total flows by weight, or 45.6 million tons in 2001 and are expected to account for 73 percent of the total flows by weight, or 72.7 million tons, in 2020. The top four commodity groups by value (electronics, vehicles, and precision goods; pharmaceutical and chemical products; wood products, textiles, and leather; and furniture and miscellaneous products) accounted for approximately 87 percent of the total flows by value, or $61.6 billion (U.S. dollars) in 2001 and are expected to account for approximately 83 percent of the total flows by value, or $117.6 billion (U.S. dollars) in 2020. This finding reflects the diversity of the EBTC region's economy, which consists of traditional resource-based industries that produce wood, pulp and paper, and other products; as well as high value-added manufacturing industries, such as the automotive industry in Michigan and Ontario. Because rail is a key component of the supply and distribution chains of these diverse industries, the region's economic competitiveness relies in part on the ability of the rail system to provide efficient, reliable service.

- **The United States is and will continue to be a net importer of cross-border rail trade from Canada**. Though trade between the United States and Canada is currently balanced in some commodities, including pharmaceutical and chemical products and stone, minerals, and ores, nearly three-quarters of total EBTC cross-border rail flows currently originate in Canada and are transported to the United States. This imbalance is expected to hold true in 2020, though trade in certain commodities will become more balanced. Trade in electronics, vehicles, and precision goods, for instance, is expected to be essentially balanced between the United States and Canada in 2020, which was not the case in 2001. This trend is largely being driven by the automotive industry, which will comprise a significant portion of the electronics, vehicles, and precision goods that are projected to be transported within the EBTC region in 2020.

Cross-Border Rail Data, Forecasting, and Mapping

Although the objective of this study was to provide the EBTC and its member agencies with a more comprehensive understanding of freight rail movements across the Canada-U.S. border, several key findings that relate to the accuracy and reliability of existing sources of cross-border rail data and the difficulties encountered when attempting to forecast and map these data were also identified. The findings presented in this section may be helpful to the EBTC, its member agencies, and other states and provinces in understanding the limitations of existing cross-border rail datasets. An understanding of the strengths and limitations of these existing data sources is critical when using these data to guide transportation planning activities or to identify and justify transportation investments.

- **There is no single, reliable, comprehensive source of cross-border rail data**. There are several different datasets that can be used to describe cross-border freight rail movements. Cross-border rail information is collected and summarized in many different datasets, including the Bureau of Transportation Statistics (BTS), the Transborder Surface Freight Trade Data (TSFD), Statistics Canada, Reebie Associates, the Surface Transportation Board (STB), and the Federal Highway Administration (FHWA). The sources for these datasets, as well as the information they provide to users, differs significantly. The BTS Border Crossing data, for instance, provide information on the total numbers of trains or containers crossing the border from Canada to the U.S., but do not include weight or value information or data on U.S.-Canada movements. The TSFD data provide information on both U.S.-Canada and Canada-U.S. movements, but do not provide commodity-specific information. Statistics Canada data provide adequate commodity and origin/destination detail, but the gateway information relates to the province of clearance, not necessarily the location where the freight physically crossed the Canada-U.S. border. The STB Carload Waybill Sample is based on actual information collected from railroad carriers, but since the STB does not have jurisdiction over Canadian carriers, U.S. exports to Canada are often under-reported in the data. Because each of these datasets provides only a snapshot of information and measures different aspects of cross-border rail movements, it is difficult for any single dataset to completely describe cross-border rail flows and even more difficult to compare the information contained in these datasets against each other to verify cross-border rail flows.

- **The accuracy of cross-border rail data decreases as the level of geographic detail becomes more refined**. In many commodity flow databases, including cross-border rail data, the accuracy of the data decreases as the geographic regions become smaller. That is, commodity flows between states and provinces are normally more accurate than commodity flows between counties, zip codes, and traffic analysis zones. One reason for this decrease in accuracy is that public entities are often prohibited from publishing data that would disclose the operations of individual firms or establishments. Many publicly available commodity flow databases, for example, aggregate their data for specific regions in such a way as to protect the confidentiality of industry participants. This is also a common practice for publicly available socioeconomic data, such as employment statistics, which are often used in the development of commodity flow databases. For these and other reasons, data describing cross-border rail flows at individual U.S.-Canada gateways often varies widely from dataset to dataset. While these existing cross-border rail datasets are useful in identifying general trends, they often cannot support the needs of states, provinces, and MPOs when conducting more detailed transportation planning activities.

- **There is no single source of cross-border rail forecasts**. Many state and provincial government entities develop their own economic forecasts to guide future policy decisions and there are many private sector sources of economic forecasts that can be used to develop projections of future cross-border rail movements. However, there is no single source of information that can be used to quickly and inexpensively develop reliable forecasts of regional cross-border rail activity. As a result, transportation planners in the EBTC region and elsewhere must evaluate a wide range of factors, including historical trade patterns, general economic and industry growth patterns, and employment trends, and use that information to develop estimates of future rail flows.

- **Modeling and mapping rail flows differs significantly from highway (truck) modeling and mapping efforts**. Railroad operations differ significantly from highway (truck) operations, making it more difficult to model and map rail flows as compared to highway flows. While trucks are often concerned with minimizing cost or travel time between origins and destinations, railroads are often more concerned with maximizing their income for each individual shipment. When a rail shipment occurs on more than one railroad, the revenue from that shipment is divided among the railroad carriers that were involved in the transport. The originating and terminating railroads often receive anywhere from eight percent to 20 percent of the revenue, with the remainder divided among the railroads that handled the shipment in between. In general, the longer a shipment remains on an individual railroad's trackage, the more revenue that railroad can expect to receive.[15] As a result, while a fair representation of highway movements can be estimated using a shortest path algorithm, modeling and mapping rail movements often depends on a deeper understanding of rail operations, interline agreements between individual railroads (which can affect routing), and other factors.

[15] Black, W.R., *Transport Flows in the State of Indiana: Commodity Flow Database Development and Traffic Assignment, Phase 2*.

5.2 Recommendations

The following recommendations are provided to the EBTC and its member agencies to guide future rail and other planning activities.

- **The EBTC should continue to conduct studies and analyses to broaden the level of understanding of cross-border freight movements and their impact on North American transportation systems and economic vitality**. The EBTC has played an important role in enhancing the understanding of cross-border freight flows by facilitating communication and cooperation among state, provincial, and metropolitan member agencies and also through specific efforts, such as the *Truck Freight Crossing the Canada-U.S. Border* study and this cross-border rail study. The EBTC and its member agencies should continue to conduct these types of cross-border trade and transportation analyses, as they are effective ways to describe the volume of cross-border trade between the United States and Canada and assess the impact of that trade on the North American transportation system and the economic vitality of the United States and Canada.

- **The EBTC should work with Federal agencies in the United States and Canada to develop a more comprehensive freight data collection and dissemination program**. The FHWA is in the process of updating its Freight Analysis Framework (FAF) by improving data collection methods; improving and broadening the data sources used to create the FAF dataset; and developing a freight model improvement program. The lessons learned from this *Study of Rail Freight Crossing the Canada-U.S. Border* could be useful to the FHWA and other Federal agencies in the United States and Canada as they attempt to improve the quality, quantity, and reliability of freight data. The EBTC should work closely with these and other agencies to ensure that cross-border freight data needs and issues are adequately addressed as part of these efforts.

- **EBTC member agencies should continue to address freight rail movements – and cross-border freight rail movements, in particular – as part of their own transportation planning and programming activities**. This study and previous efforts of the EBTC have highlighted the impacts of cross-border trade and transportation on statewide, provincial, and metropolitan transportation systems and economic vitality. The EBTC itself, however, has limited ability to implement projects or strategies that can improve the efficiency of cross-border movements. As such, individual member agencies of the EBTC should work to ensure that freight rail movements – and cross-border freight rail movements in particular – are addressed as part of their own transportation planning and programming activities.

- **The EBTC and its member agencies should participate in other existing regional rail studies**. The efficiency of the North American rail system has attracted the attention of many U.S. agencies and there are many examples of recent or ongoing studies that are addressing the ability of the rail system to handle project volumes of freight. The American Association of State Highway and Transportation Officials (AASHTO) recently completed a Rail Bottom-Line report, which evaluated the capacity of the U.S.

freight-rail transportation system to keep pace with the economic growth projected for 2020. The I-95 Corridor Coalition is undertaking a Northeast Rail Operations (NEROps) Study that will lay the groundwork for the development of a regional rail improvement program to identify and make recommendations to eliminate key rail choke points – physical, operational, and information-system – in the Northeast states thereby increasing freight-rail and passenger-rail service capacity and relieving congestion on the region's rail, highway, and air systems. As the lessons learned from this *Study of Rail Freight Crossing the Canada-U.S. Border* could be useful in these and other regional planning activities, the EBTC and its member agencies should become involved in these other efforts.

Appendix A

Appendix A

This appendix documents the initial review of four cross-border Canada-United States rail datasets: Cross-border rail data available from Statistics Canada, Reebie Associates TRANSEARCH data, Transborder Surface Freight Trade Data, and the Bureau of Transportation Statistics (BTS) Border-Crossing Data.

There are four characteristics that can be used to describe a cross-border commodity flow database. Ideally, the dataset chosen for use in this Cross-Border Rail study would contain each of the following elements:

- **Commodity Detail –** The dataset should provide adequate detail describing the types of commodities crossing the border. Standard Transportation Commodity Classification (STCC) codes, Standard Classification of Transported Good (SCTG) codes, or Harmonized System (HS) codes at the two-digit level are commonly used commodity classification schemes.

- **Commodity Weight Detail –** Data describing the weight of classified commodities crossing the border are important in understanding the ways in which freight vehicles are using the transportation system. These data are also necessary to complete the commodity flow analysis portion of this study.

- **Commodity Value Detail –** Data describing the value of commodities crossing the border are useful in creating a more holistic picture of cross-border freight movements and how they may affect statewide, provincial, and regional economies. Commodity value can be calculated using value per ton information created by Cambridge Systematics and derived from BTS data.

- **Gateway Detail –** This characteristic is unique to cross-border studies. Understanding precisely where commodities cross the border (gateways) is important in estimating trade patterns and associated transportation impacts. Unfortunately, many cross-border datasets – particularly those that rely on customs information – do not accurately report gateway information, instead reporting where customs bills are paid (which may involve customs brokers or company headquarters) as opposed to the actual shipping and receiving locations.

The following sections provide a brief overview of each of the four datasets evaluated, describe the degree to which these datasets contain each of the elements described above, and identify the issues that may affect each dataset's appropriateness for use in this study.

Statistics Canada Cross-Border Rail Data

Overview

The Ministry of Transport Ontario (MTO) recently purchased data from Statistics Canada (Stats Canada) describing merchandise trade between the United States and Canada. Both "import" (United States to Canada) and "export" (Canada to United States) data were provided. Data fields include:

- **Mode of Transport**, in this case rail only;
- **Year**, in this case 2001;
- **Commodity Classification**, at the two-digit HS6 level;
- **Port**, which appears to be the port of customs clearance (not the gateway);
- **Weight**, in kilograms; and
- **Value**, in Canadian dollars.

Analysis of these data provide the following import/export information for all states and provinces. All values are in United States short tons:

- **Canada-United States Movements**: 70.9 million tons; and
- **United States-Canada Movements**: 21.8 million tons.

Issues

There are several issues surrounding the Stats Canada data that may affect its appropriateness for use in this study:

- **Gateways Not Specifically Identified –** While the Stats Canada data do provide information on ports of entry/exit, these ports do not necessarily correspond with the gateways through which the commodities physically crossed the border. Rather, they are related to the Customs ports where the freight was cleared for entry/exit. Lack of gateway information makes it difficult to summarize commodity flows by crossing, a key element of this study.

- **Lack of Commodity, Weight, and Crossing Detail across Datasets –** The Stats Canada data consist of several different datasets that provide information on cross-border commodities, commodity weight, and ports of entry/exit. However, there is not a consistent level of detail for these elements across datasets. For example, the dataset describing imports and exports by port of entry/exit does not include commodity classification or weight data. Similarly, while the dataset describing total imports and exports does provide commodity classification, weight, and value information, it does not include information on port of entry/exit. The lack of consistent information

describing commodity classification, weight, value, and port of entry/exit makes it difficult to create a dataset that has the full complement of data required for this study.

- **Different Numbers of Ports for Imports and Exports –** An analysis of the Stats Canada data show that there are 44 ports of exit for Canada-United States rail movements, but 121 ports of entry for United States-Canada movements. A significant number of these ports of entry/exit are located away from the border, indicating that they may in fact be customs ports of entry, rather than gateways.

Summary

The Stats Canada data may be inappropriate for use in this study, as gateways are not specifically identified and there is a lack of commodity, weight, and crossing detail across the various datasets that make up this source.

Reebie TRANSEARCH Data

Overview

TRANSEARCH is a privately maintained market research database for intercity freight traffic flows compiled by Reebie Associates. The database includes information describing commodities (by Standard Transportation Commodity Classification (STCC) code), tonnage, origin and destination markets, and mode of transport. Data are obtained from Federal, state, provincial agencies, trade and industry groups, and a sample of private sector freight transportation providers. TRANSEARCH has the following characteristics:

- Origin and destination of cross-border rail flows by United States county and Canadian province;
- Two-digit STCC commodity detail;
- Crossing detail (i.e., the county where the rail freight crossed the Canada-United States border); and
- Commodity value (in U.S. dollars).

Issues

There are several issues with the TRANSEARCH data that may affect its appropriateness for use in this study:

- **Truck data are not included**, making it difficult to compare with EBTC truck study data or do diversion analysis, as was originally proposed.

- **Use of Multiple Data Sources –** The commodity flow data developed by Reebie Associates consist of a national database built from company-specific data and other available databases. To customize the dataset for a given region and project, local and regional data sources are often incorporated. This incorporation requires the development of assumptions that sometimes compromise the accuracy of the resulting database. Different data sources use different classifications; most economic forecasts are based on SIC codes while commodity data are organized by STCC codes. Conversions between different classification schemes can sometimes lead to some data being miscategorized or left unreported.

Summary

The TRANSEARCH may provide the best combination of commodity detail, weight and value detail, and gateway detail required of cross-border commodity flow data.

Transborder Surface Freight Trade Data

Overview

The Transborder Surface Freight Trade dataset is maintained by the U.S. Bureau of Transportation Statistics (BTS) and data are available from April 1993 forward. This dataset provides information describing the value of North American trade by commodity; surface mode of transportation (rail, truck, pipeline, mail, and other); and shipment origin and destination (state, province, U.S. Customs Port of Entry, or Canadian point of clearance). TSFD data are updated monthly and are extracted from the U.S. Census Foreign Trade Statistics Program. Import and export data are captured from administrative records required by the U.S. Departments of Commerce and Treasury.

Issues

There are two issues with the TSFD data that may affect its appropriateness for use in this study:

- **Insufficient Commodity Detail –** TSFD data do not provide sufficient commodity detail and many are only reported for large commodity groupings, preventing identification and evaluation of top commodities. This limits the effectiveness of these data in identifying the specific types of commodities moving within the region and how they may be expected to change in the future, a key outcome of this project.

- **Origin-Destination Mismatches –** Use of TSFD data often result in mismatches between origins and destinations reported in the data and the true origins and destinations of

vehicles crossing the border, as TSFD data reflect information from customs bills. While these customs bills should capture the origin and destination of the shipment, the addresses on customs bills sometimes reflect where the bill is paid which may involve customs brokers or company headquarters as opposed to the actual shipping and receiving locations.

Summary

The TSFD are inappropriate for use in this study, as they do not contain sufficient commodity or gateway detail to analyze and map existing or future cross-border rail flows.

United States-Canada Border-Crossing Data

Overview

The U.S. Bureau of Transportation Statistics (BTS) provides United States-Canada annual border-crossing data beginning in 1997. These data are collected monthly at border ports by the U.S. Customs Service and are summarized and organized at the port level by BTS. Rail data provided within this dataset reflect the number of trains that have entered the United States along the United States-Canadian border, but provide no information on origins or destinations, commodities handled, or routes utilized. The U.S. Customs Service does not collect comparable data on outbound vehicles.

Issues

There is one issue with the BTS border-crossing data that may affect its appropriateness for use in this study:

- **Lack of Commodity, Weight, and Value Information –** The BTS data do not report the total tonnage or value of commodities crossing the border by rail, nor does the dataset identify specific commodity types. Only the number of cross-border trains or containers are reported. While these data are useful for estimating overall volumes at border crossings, the lack of commodity detail makes it difficult to forecast and map flows of specific cross-border commodities.

Summary

The BTS Border-Crossing data are inappropriate for use in this study, as they do not contain sufficient commodity, weight, and value information to analyze and map existing or future cross-border rail flows.

Appendix B

Appendix B

Appendix B compares and contrasts the different types of information available from each of the datasets considered for the study, and describes key findings that may be useful to states, provinces, MPOs, and regional coalitions when attempting to utilize these data to support statewide, provincial, or regional planning activities.

Comparison of Cross-Border Rail Freight Flow Databases

Table 1 provides a summary of the available cross-border rail datasets and their characteristics.

Table 1. Cross-Border Rail Dataset Characteristics

Data Set	U.S.-Canada Movements	Canada-U.S. Movements	Gateway Detail	Commodity Detail	Weight Detail	Value Detail
Stats Canada	✓	✓	Province of Clearance	SCTG or HS (two-digit)	Kilograms	$Canadian
FAF	✓	✓	County	STCC (two-digit)	Tons	$U.S.
BTS	Not Available	✓	Customs Port of Entry	None	None	None
TSFD	✓	✓	Customs Port of Entry	None	None	$U.S.
EBTC TRANSEARCH	✓	✓	County	STCC (two-digit)	Tons	$U.S.
STB Waybill Sample	✓	✓	Transborder "Flag" Only	STCC (four-digit)	Tons	Not Included

As can be seen in Table 1, existing cross-border rail freight datasets measure several different aspects of cross-border freight rail movements. The BTS Border Crossing data, for instance, provide information on the total numbers of trains or containers crossing the border from Canada to the U.S., but do not include weight or value information or data on U.S.-Canada movements. The TSFD data provide information on both U.S.-Canada and Canada-U.S. movements, but do not provide commodity-specific information. Stats Canada data provide adequate commodity and origin/destination detail, but the gateway information relates to the province of clearance, not necessarily the location where the freight physically crossed the Canada-U.S. border.

Because each dataset measures a different aspect of cross-border rail movements, it is difficult to compare the results and make inferences on the validity of any one cross-border rail dataset over any other. However, comparing different datasets can provide insight to planners into the adequacy of existing cross-border freight rail datasets for use in studies like the *Study of Rail Freight Crossing the Canada-U.S. Border* or in other statewide, provincial, or regional transportation planning activities.

Comparison of Total Trade

The available cross-border rail datasets were summarized to facilitate a comparison of total cross-border trade by weight and value. Tables 2 and 3 compare the results of analyses of the existing cross-border rail datasets to the results of the analysis of the EBTC TRANSEARCH dataset used in this study.

Table 2. Total Tonnage Reported by Cross-Border Rail Datasets

Dataset	Total Tons	Percent Difference from EBTC TRANSEARCH Data
EBTC TRANSEARCH	54,571,879	N/A
Stats Canada	61,980,914	12.0%
TSFD	N/A[a]	N/A
BTS Border Crossing	41,472,883[b]	-2.4%
FAF	47,207,427	-13.5%
STB Waybill Sample	55,532,598	1.8%

[a] TSFD measure value only; no tonnage information is provided.

[b] One-way flows only (Canada-U.S.); total cross-border railcars assumed to be two-thirds bulk traffic; one-third intermodal. Bulk cars converted to tons using 50 ton/railcar; intermodal cars converted to tons using 22 ton/railcar. All information from the Association of American Railroads for 2001.

As can be seen in Table 2, the total cross-border rail tonnage reported by the EBTC TRANSEARCH dataset is significantly lower than the total tonnage reported by the Stats Canada data (difference of approximately 7.4 million tons, or 12 percent); and is significantly higher than that reported by the FAF data (difference of approximately 7.3 million tons, or approximately 14 percent). The EBTC TRANSEARCH data and STB Carload Waybill sample are nearly identical, with a difference of only 0.96 million tons, or 1.8 percent. Note that the BTS Border Crossing data only measure flows from Canada to the U.S. and only measure the number of railcars, not tonnage. When these railcars are converted to tons and compared to the Canada-U.S. flows reported in the EBTC TRANSEARCH data, there is a difference of approximately 0.9 million tons, or two percent. Also note that TSFD data do not provide tonnage information.

As can be seen in Table 3, the total value of cross-border rail movements reported by the EBTC TRANSEARCH dataset is significantly lower than the total value reported by the Stats Canada data (difference of $7.2 billion (U.S.), or approximately 10 percent); and is significantly higher than that reported by the TSFD data (difference of approximately $13.7 billion (U.S.), or approximately 21 percent). Note that the STB Carload Waybill Sample does not provide value information.

Table 3. Total Value Reported by Cross-Border Rail Datasets

Dataset	Total Value (U.S.$)	Percent Difference from EBTC TRANSEARCH Data
EBTC TRANSEARCH	$66,769,697,449	N/A
Stats Canada	$74,046,957,206[a]	9.8%
TSFD	$53,055,349,483	-20.5%
BTS Border Crossing	N/A[b]	N/A
FAF	N/A[c]	N/A
STB	N/A[d]	N/A

[a] Converted from $CAN to $US using conversion factor of 0.6458. This conversion factor represents the average conversion rate for 2001 as reported by the U.S. Federal Reserve Bank.

[b] BTS Border Crossing data do not include value information.

[c] Cross-Border data available from FAF do not include value information

[d] STB Waybill data do not include value information.

Comparison of Trade by Gateway

The available cross-border rail datasets were also summarized to facilitate a comparison of total cross-border trade (by weight and value) by individual gateway. Table 4 compares the results of analyses of the existing cross-border rail datasets to the results of the analysis of the EBTC TRANSEARCH dataset used in this study.

As can be seen in Table 4, there are significant discrepancies between cross-border datasets when a gateway analysis is conducted. This is not entirely surprising, as most commodity flow datasets tend to become less accurate as the level of geographic detail becomes finer. In general, a national-level dataset is more accurate than a state or provincial-level dataset which, in turn, is more accurate than county-level or zip code-level data.

	EBTC Transearch		TSFD		FAF		BTS	
Gateway	**Total Weight**	**Total Value**	**Total Value**	**Percent Difference from EBTC**	**Total Weight**	**Percent Difference from EBTC**	**Total Weight**	**Percent Difference from EBTC**
International Falls Bridge	8,580,681	$5,778,993,485	$4,012,199,939	-31%	4,466,923	-92%	6,832,569	-25.6%
Sault Ste Marie Bridge	3,741,906	$1,691,932,992	$591,468,434	-65%	1,100,030	-71%	962,133	-289%
St. Clair River Tunnel	10,855,251	$19,031,351,335	$22,913,809,465	20%	4,930,653	-55%	12,982,467	16%
Windsor-Detroit Tunnel	10,519,673	$20,808,615,178	$11,908,222,675	-43%	19,922,129	89%	9,869,353	-7%
Niagara-Buffalo	7,025,939	$8,705,091,568	$10,496,986,358	21%	8,378,442	19%	4,834,331	-45%
Ft. Covington-Trout River	2,707,935	$2,061,443,296	$967,494,632	-53%	829,626	-69%	1,183,929	-129%
Champlain-Rouses Point	3,773,465	$3,702,032,536	$1,098,360,115	-70%	3,224,585	-15%	2,423,083	-56%
Alburg	82,473	$45,942,595	$540,546,205	1077%	790,015	858%	800,117	90%
Derby Line	33,337	$9,406,340	$927,367	-90%	639,272	1818%	0	N/A
Norton	132,390	$70,841,334	$274,757,145	288%	11,300	-91%	454,775	71%
Lowellton	657,938	$403,635,558	$29,604,181	-93%	706,215	7%	505,324	-30%
Van Buren	702,933	$371,108,783	$24,606,145	-93%	1,058,323	51%	54,249	-1196%
Calais-Vanceboro	0	$4,089,302,449	$196,366,822	-95%	822,480	N/A	570,553	100%
Non-EBTC Gateway	65,114	N/A	N/A	N/A	N/A	N/A	0	N/A
Unknown EBTC Gateway	1,493,379	N/A	N/A	N/A	327,434	-78%	0	N/A
Unknown Gateway	572,212	N/A	N/A	N/A	N/A	N/A	0	N/A

Key Findings

There are several key findings related to the analysis of cross-border rail datasets described in this memorandum.

- **There are several different datasets that can be used to describe cross-border freight rail movements**. Cross-border rail information is collected and summarized in many different datasets, including the Bureau of Transportation Statistics, the Transborder Surface Freight Trade Data, Statistics Canada, Reebie Associates, the Surface Transportation Board, and the Federal Highway Administration. The sources for these datasets, as well as the information they provide to users, differs significantly, though. The BTS Border Crossing data, for instance, provide information on the total numbers of trains or containers crossing the border from Canada to the U.S., but do not include weight or value information or data on U.S.-Canada movements. The TSFD data provide information on both U.S.-Canada and Canada-U.S. movements, but do not provide commodity-specific information. Stats Canada data provide adequate commodity and origin/destination detail, but the gateway information relates to the province of clearance, not necessarily the location where the freight physically crossed the Canada-U.S. border. The STB Carload Waybill Sample is based on actual information collected from railroad carriers. But because the STB does not have jurisdiction over Canadian carriers, U.S. exports to Canada are often under-reported in the data. Because each of these available datasets measures a different aspect of cross-border rail movements, it is difficult to compare the results and make inferences on the validity of any one cross-border rail dataset over any other. However, comparing different datasets can provide insight to planners into the adequacy of existing cross-border freight rail datasets for use in statewide, provincial, or regional planning activities.

- **There is no "gold standard" for cross-border rail data**. As discussed above, there are several existing cross-border rail datasets available from both public and private sources. While each provides useful information, there is no single source of cross-border rail data that provides sufficient geographic, commodity, weight, value, and routing detail to facilitate cross-border freight rail planning efforts. Planners should be careful to understand the source, scope, and limitations of cross-border rail data when conducting cross-border freight rail planning activities.

- **The accuracy of all cross-border rail datasets decreases as the level of geographic detail becomes more refined**. There are significant discrepancies when comparing cross-border rail datasets by specific border gateway. This is not entirely surprising, as commodity flow datasets are typically less accurate at finer levels of geographic detail (i.e., counties, zip codes, traffic analysis zones) than at higher levels (i.e., state, province, national). The discrepancies among the existing cross-border rail datasets can likely be attributed to the different ways by which cross-border flows are assigned to the North American rail network and summarized by different agencies. While the EBTC TRANSEARCH database used in this study likely provides a reasonable

estimation of cross-border rail flows by gateway, these flows should be verified by specific railroad carriers to ensure their accuracy.

- The EBTC TRANSEARCH database used in the *Study of Rail Freight Crossing the Canada-U.S. Border* seem to be consistent with other cross-border rail datasets, when analyzing total U.S.-Canada trade within the EBTC region. Clearly there are discrepancies among the TSFD, BTS, FAF, STB, and EBTC TRANSEARCH databases analyzed within this memorandum. However, these discrepancies seem reasonable and can likely be attributed to differences by which cross-border rail data are collected, analyzed, and summarized by different agencies.

Appendix C

Appendix C

Appendix C provides tables that detail the annual tonnage and value of goods carried by rail between Canada and the Unites States.

Table C.1 Weight of Rail Freight at EBTC Border Crossings
2001

Rail Freight Two Way	%	One Way	%	Prov.	Major Crossing	Rail Freight	%	State	%	Rail Freight One Way	%	Two Way
					International Falls Bridge	8,580,681	16.4%	**MN**	21.0%	8,508,728	16.4%	8,580,681
					Sault Ste. Marie Bridge	3,741,906	7.1%					
40,716,916	77.7%	8,407,923	70.1%	**ON**	St. Clair River Tunnel	10,855,251	20.7%	**MI**	47.8%	19,337,443	47.9%	25,110,296
					Windsor-Detroit Tunnel	10,513,139	20.0%					
					Niagara-Buffalo	7,025,939	13.4%					
					Ft. Covington-Trout River	2,707,935	5.2%	**NY**	21.6%	8,734,720	25.8%	13,507,339
					Champlain-Rouses Point	3,773,465	7.2%					
					Alburg	82,473	0.2%					
7,387,538	14.1%	2,863,355	23.9%	**QC**	Derby Line	33,337	0.1%	**VT**	0.3%	126,566	0.5%	248,200
					Norton	132,390	0.3%					
					Lowellton	657,938	1.3%					
					Van Buren	702,933	1.3%					
4,330,186	8.3%	720,750	6.0%	**NB**	Vanceboro	3,069,715	5.9%	**ME**	9.2%	3,735,155	9.5%	4,988,124
					Calais	557,538	1.1%					
52,434,640	100%	11,992,028	100%			52,434,640	100%		100%	40,442,612	100%	52,434,640

Table C.2 Value of Rail Freight at EBTC Border Crossings
2001 (Millions, U.S. Dollars)

Rail Freight Two Way	%	One Way	%	Prov.	Major Crossing	Rail Freight	%	State	%	Rail Freight One Way	%	Two Way
					International Falls Bridge	6,079	9.0%	**MN**	10.6%	5,767	9.0%	6,079
					Sault Ste. Marie Bridge	2,076	3.1%					
56,176	83.2%	8,485	64.8%	**ON**	St. Clair River Tunnel	18,452	27.3%	**MI**	66.7%	36,264	60.6%	40,899
					Windsor-Detroit Tunnel	20,372	30.2%					
					Niagara-Buffalo	9,198	13.6%					
					Ft. Covington-Trout River	2,176	3.2%	**NY**	16.7%	9,092	22.1%	14,937
					Champlain-Rouses Point	3,563	5.3%					
					Alburg	406	0.6%					
6,730	10.0%	3,102	23.7%	**QC**	Derby Line	36	0.1%	**VT**	0.2%	95	0.8%	536
					Norton	94	0.1%					
					Lowellton	456	0.7%					
					Van Buren	422	0.6%					
4,576	6.8%	1,498	11.5%	**NB**	Vanceboro	2,753	4.1%	**ME**	5.8%	3,179	7.5%	5,032
					Calais	1,400	2.1%					
67,482	100%	13,085	100%			67,482	100%		100%	54,397	100%	67,482

Source: EBTC TRANSEARCH database.

NB: Tables C.1 and C.2 present the volume of freight that passes through each of the major EBTC rail crossings. As discussed in this report, much of this freight originates or terminates in locations outside of the EBTC region. Cross-border rail freight that passes through "unknown gateways" (described in Section 2.2) is not included in this summary.

Appendix D

Appendix D

Table D provides a list of the Standard Classification of Transported Good (SCTG) codes and associated commodity descriptions.

Table D. Standard Classification of Transported Good (SCTG) Codes

SCTG Code	Commodity Name
01	Live animals and live fish
02	Cereal grains
03	Other agricultural products
04	Animal feed and products of animal origin, n.e.c.
05	Meat, fish, seafood, and their preparations
06	Milled grain products and preparations, and bakery products
07	Other prepared foodstuffs and fats and oils
08	Alcoholic beverages
09	Tobacco products
10	Monumental or building stone
11	Natural sands
12	Gravel and crushed stone
13	Nonmetallic minerals, n.e.c.
14	Metallic ores and concentrates
15	Coal
16	Crude petroleum oil and bituminous mineral oil
17	Gasoline and aviation turbine fuel
18	Fuel oils
19	Coal and petroleum products, n.e.c.
20	Basic chemicals
21	Pharmaceutical products
22	Fertilizers
23	Chemical products and preparations, n.e.c.
24	Plastics and rubber
25	Logs and other wood in the rough
26	Wood products
27	Pulp, newsprint, paper, and paperboard
28	Paper or paperboard articles
29	Printed products
30	Textiles, leather, and articles of textiles or leather
31	Nonmetallic mineral products
32	Base metal in primary or semi-finished forms and in finished basic shapes
33	Articles of base metal
34	Machinery
35	Electronic and other electrical equipment and components, and office equipment
36	Motorized and other vehicles (including parts)
37	Transportation equipment, n.e.c.
38	Precision instruments and apparatus
39	Furniture, mattresses and mattress supports, lamps, lighting fittings, and illuminated signs
40	Miscellaneous manufactured products
41	Waste and scrap
42	Miscellaneous Transported Products