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*Intermodal Surface Transportation Efficiency Act
Section 6015 Study: Assessment of Border Crossings
and Transportation Corridors for North American
Trade (Northeast)*

An Assessment of the Adequacy of U.S–Canadian Infrastructure to Accommodate the Trade through Eastern Border Crossings

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The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 calls for a study of U.S. international border crossings. The objective of the study is to identify existing and emerging trade corridors and transportation subsystems that facilitate trade between the United States, Canada, and Mexico.

This report contains an assessment of infrastrstructure in place and planned, an identification of current trade and transportation flows, and an assessment of emerging trade corridors.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
	AREA			
in^2	square inches	645.2	square millimeters	mm^2
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yd^2	square yards	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
	VOLUME			
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: Volumes greater than 1000 l shall be shown in m^3.				
	MASS			
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5(F-32)/9 or (F-32)/1.8	Celcius temperature	°C
	ILLUMINATION			
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
	FORCE and PRESSURE or STRESS			
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
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mm	millimeters	0.039	inches	in
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m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
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ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
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L	liters	0.264	gallons	gal
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m^3	cubic meters	1.307	cubic yards	yd^3
	MASS			
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
	TEMPERATURE (exact)			
°C	Celcius temperature	1.8C + 32	Fahrenheit temperature	°F
	ILLUMINATION			
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
	FORCE and PRESSURE or STRESS			
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

* SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.

(Revised September 1993)

An Assessment of the Adequacy of U.S–Canadian Infrastructure to Accommodate the Trade through Eastern Border Crossings

Sponsored by the
Office of Policy Development
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August 1994

PREFACE

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 called for a study of U.S. international border crossings. The objective of the study was to 'identify existing and emerging trade corridors and transportation subsystems that facilitate trade between the United States, Canada, and Mexico.' The Federal Highway Administration, U.S. Department of Transportation, conducted this study. The study assessed the adequacy of transportation infrastructure at the borders to accommodate current and future trade and traffic levels. In order to accomplish this objective, three subtasks were defined:

- Conduct an inventory of current and planned infrastructure at the borders.
- Identify existing international trade corridors among the North American trading partners.
- Identify emerging trade corridors.

In the conduct of this study, available data were collected from Canadian, the U.S. and Mexican public and private sources. The study team undertook an extensive outreach effort to bring local and state interests into the process. Shippers and carriers participated in meetings across the country to identify issues and to provide recommendations and suggested solutions. Meetings were held in Canada and Mexico to gain a better perspective to the total picture of border concerns.

For practical purposes, the study was divided into several regional activities. This was to reflect separately some of the concerns and problems presumed to be unique to those regions. The results of one of these efforts is presented in this report.

The John A. Volpe National Transportation Systems Center (Volpe Center) was tasked to perform the assessment of the ability of the border crossings along the eastern, U.S.-Canadian border to meet current and future transportation needs of the trade between Canada and the U.S.

The inventory assessment was conducted by the Volpe Center and Wayne State University. This work draws upon previous studies and data collection efforts. These sources were augmented by data from border crossing authorities and inspections of facilities.

The trade flow analysis was performed using foreign trade data from the U.S. Bureau of the Census. This is the primary Federal source of data on foreign trade. This database has most of the information collected under authority granted to U.S. Customs for data on imports and to the Bureau of the Census for data on exports. The primary objectives of this data base are accounting for tariffs and items in the national income and product account. Thus much of the data important to transportation analysis is limited and the level of reliability varies. There are also severe restrictions placed on the release of detailed data to the public.

From the beginning of the process, it was determined that a purely statistical analysis could not adequately capture the concerns and knowledge in the transportation and trade community. The outreach efforts were intended to overcome this constraint. Two Roundtable meetings, held in Buffalo, New York, and St. Louis, Missouri, were important in obtaining insight from the local and regional interests. A Futures Assessment meeting held in Detroit, Michigan, provided additional input to the trade and traffic discussion. The results of these sessions are reported on separately.

This study, including the activities of the study team members conducting each of the regional analyses, is a first step in the development of a more comprehensive understanding of trade and traffic flows in North America. Applications for policy and planning at all level of government and in the private sector can be enhanced by these data and continued improvement of the information.

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1. CURRENT BORDER INFRASTRUCTURE RELATED TO U.S.-CANADA TRANSPORTATION AND TRADE

1.1 INTRODUCTION

The primary objectives of this chapter are to provide information on the current physical and operating characteristics of all border crossings, including approaches and egresses, and to identify problems, both physical and operational, that affect the ability of the existing system to handle trade and traffic flows. This chapter addresses the northeast region of the United States, from and including Sault Ste. Marie, Michigan, to Calais, Maine.

The United States and Canada have maintained the largest bilateral trading relationship in the world for a number of years, with total merchandise trade reaching $188.7 billion[1] in 1992. Since 1990, trade with Canada has increased 8.26 percent.

Land movements accounted for 87.9 percent of the total U.S.-Canada trade in 1992, with sea and air accounting for the balance. For the land mode, which is most easily categorized in terms of geographic regions, 75.3 percent, or $124.7 million of the trade, occurred at eastern ports of entry. East is defined to include ports of entry east of Minnesota, which includes land crossings from Sault Ste. Marie, Michigan, to Calais, Maine.

Land traffic patterns are concentrated through relatively few border crossings. The most significant border crossings are in the East, with the exception of the western Washington crossings. Table 1-1 shows the distribution of two-way trade by border regions. Comparable data for the shipments is given in Table 1-2.[2]

Across the U.S. Canadian border, there are approximately 123 ports of entry and border crossing stations, 78 are ports and 45 are stations. From Sault Ste. Marie, Michigan to eastern Maine, there are 25 ports of entry and 35 border stations within these ports. Fifteen of the eastern ports of entry are designated commercial ports.[3]

This chapter deals with five specific frontiers within the East that have been identified for analysis of cross-border traffic levels and border related transportation needs. Figure 1-1 depicts the locations of the 16 major ports of entry in the northeastern U.S. All but one of

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[1]All references to currency in this document are in terms of current U.S. dollars.

[2]U.S. Bureau of the Census record counts are used as proxies for the actual number of shipments.

[3]A designated port may include one or more crossings within the port. For example, the Port of Buffalo, as defined by U.S. Customs, includes three major border crossings in the Niagara region, as well as the Peace Bridge in Buffalo. District and port configurations among U.S. Federal Inspection Services (FIS) are not always consistent with one another. This further complicates classification. Finally, there are many small unstaffed crossings in the East that have not been counted in this study.

TABLE 1-1. 1992 TOTAL TRADE AT CANADIAN BORDER CROSSINGS

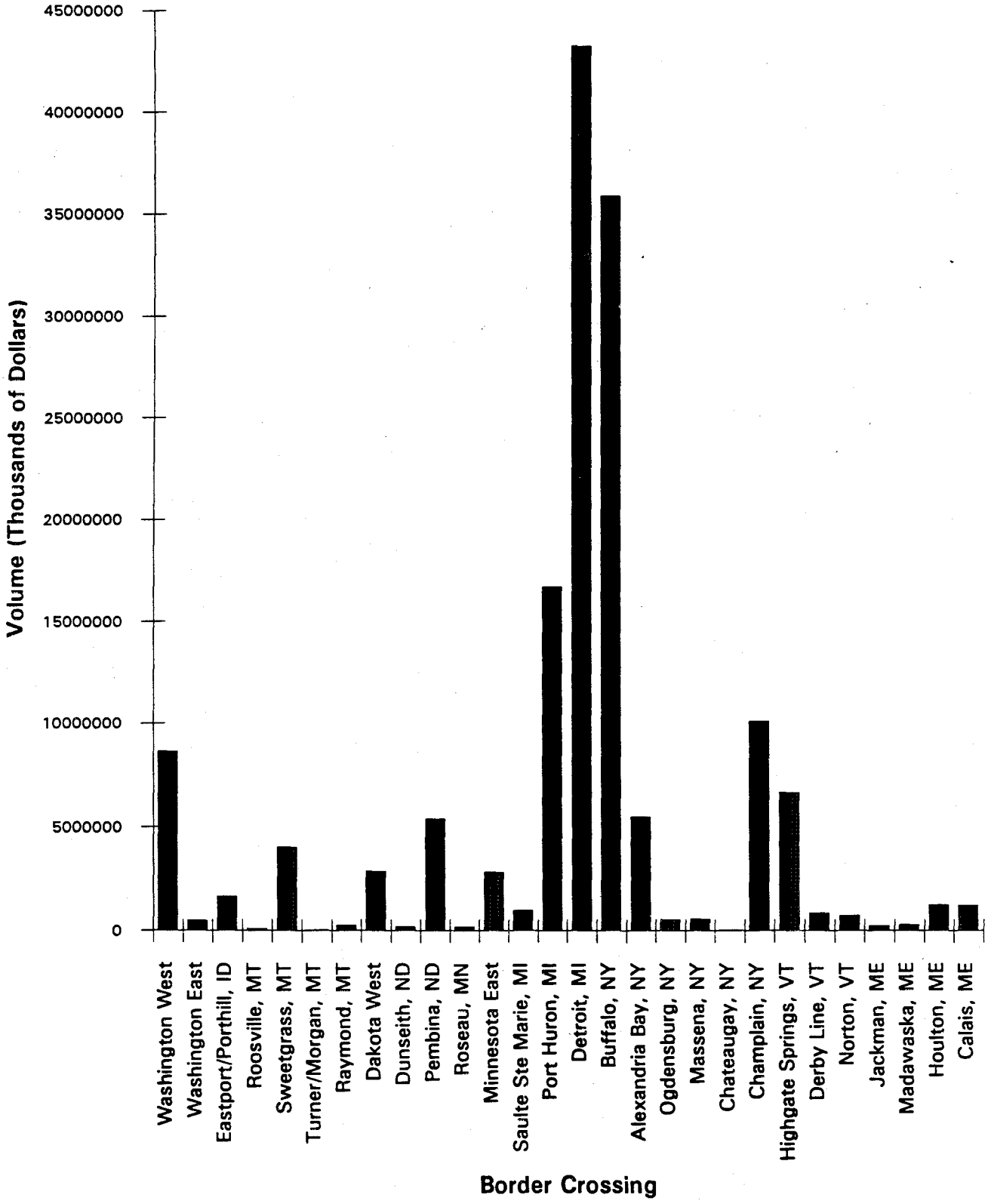
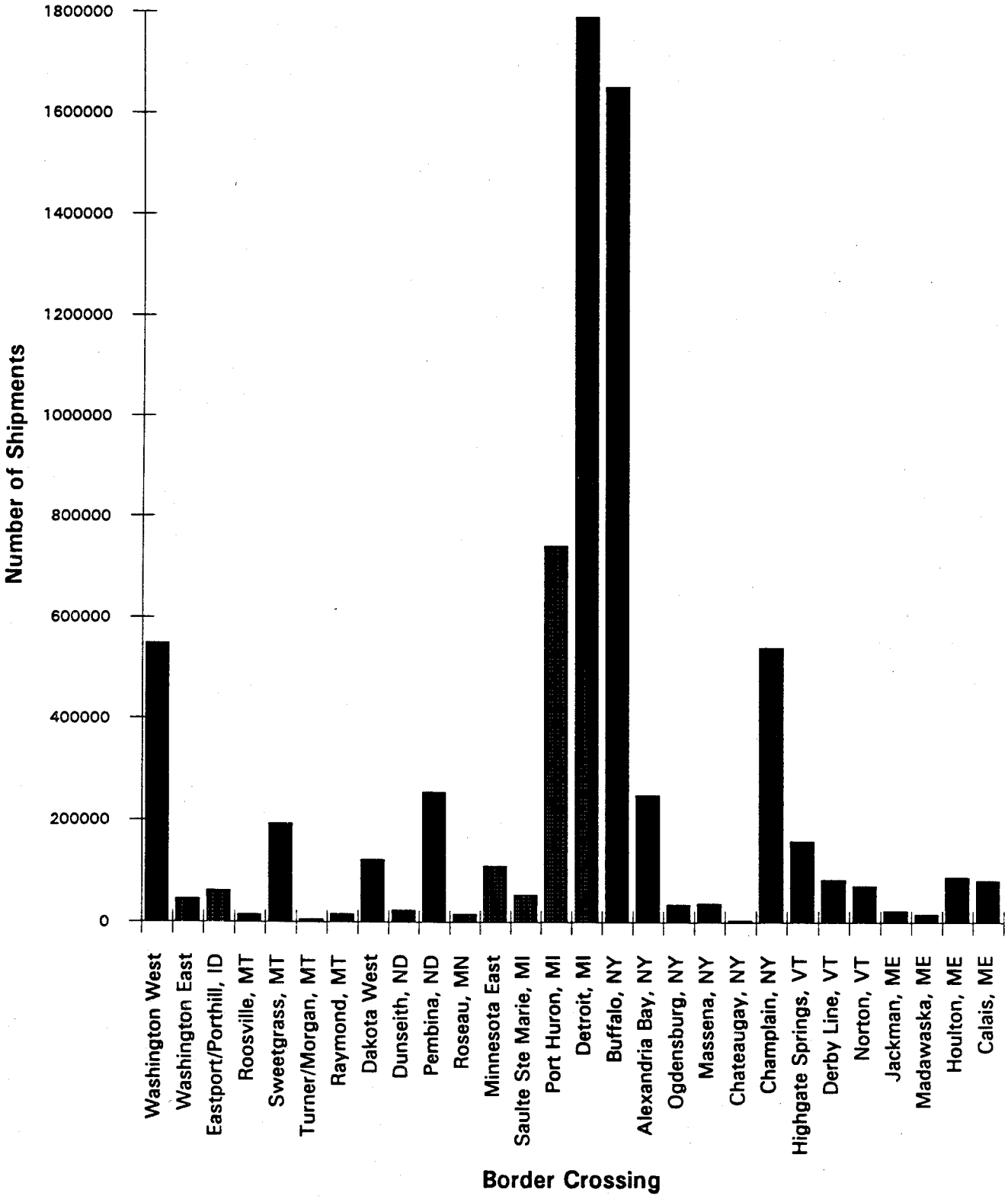


TABLE 1-2. 1992 TOTAL SHIPMENTS AT CANADIAN BORDER CROSSINGS



these ports, Madawaska, are commercial ports. Madawaska is included here due to its high volume of traffic and its status on the General Services Administration's (GSA) "top ten" priority listing.

Five frontiers composed of the 16 major ports were defined for this study. They are: Maine, Montreal South, Eastern New York, Niagara, and Michigan. The composition of each frontier can be seen in Table 1-3.

The Michigan frontier accounts for the largest portion of the dollar value of eastern trade, with $60.9 billion, or 48.8 percent of the total. The Niagara frontier accounted for $35.8 billion, or 28.7 percent of the eastern region trade. Montreal South was the third most active frontier ($17.3 billion), followed by Eastern New York ($7.7 billion) and Maine ($3.0 billion). In comparison, the busiest frontier area in the West was in Washington, where 1992 trade totaled $9.1 billion.

In terms of individual ports of entry, the busiest land port in the East is at Detroit, where 1992 trade totaled $43.2 billion. While data are not available for land crossings alone, total trade at the Detroit customs district, including Port Huron and Sault Ste. Marie, increased by 29.0 percent between 1987 and 1990. Within the Detroit District, the Ambassador Bridge at Detroit accounts for the great bulk of all trade. The second busiest port is at Buffalo where, including Niagara Falls and Buffalo, trade totaled $35.8 billion in 1992. Trade at the Buffalo District increased by 43.4 percent between 1987 and 1990. The Peace Bridge at Buffalo dominates trade in this port of entry.

In terms of highway traffic, the Buffalo-Niagara crossings are the busiest, although the Michigan Frontier has greater traffic demand than does the Niagara Frontier. Table 1-3 contains the two-way highway traffic count for 1992. The area ports comprising each frontier are also shown.

Each frontier and individual crossing is confronted with a number of unique challenges and opportunities; they are also confronted with a number of similar concerns and issues. Each border crossing can be thought of as a system, or pipeline, with a number of individual components that can constrain the flow of traffic through the system. The border crossing is only as good as its weakest link at any given point in time. The following sections identify the key crossing elements, and summarize key infrastructure issues, both physical and institutional. Detailed information on individual crossing issues and needs can be found in the border crossing profiles presented in the five stand alone Appendices to this report .

While there is considerable agreement that most delays and inefficiencies are due to institutional issues, there are several physical infrastructure needs on the Eastern U.S.-Canada border. These needs could be categorized in terms of actual border crossing physical capacity, inspection station capacity, connections to surrounding transportation infrastructure, and availability of major cross-continent transportation corridors.

The Michigan, Niagara, Eastern New York and Maine frontiers all involve water crossings with bridge and tunnel costs ranging from approximately $100 to 200 million each. These costs compare to U.S.-Mexico border bridges which typically cost $5 to 10 million. Many

FIGURE 1-1. NORTHEASTERN U.S.-CANADIAN BORDER PORTS OF ENTRY

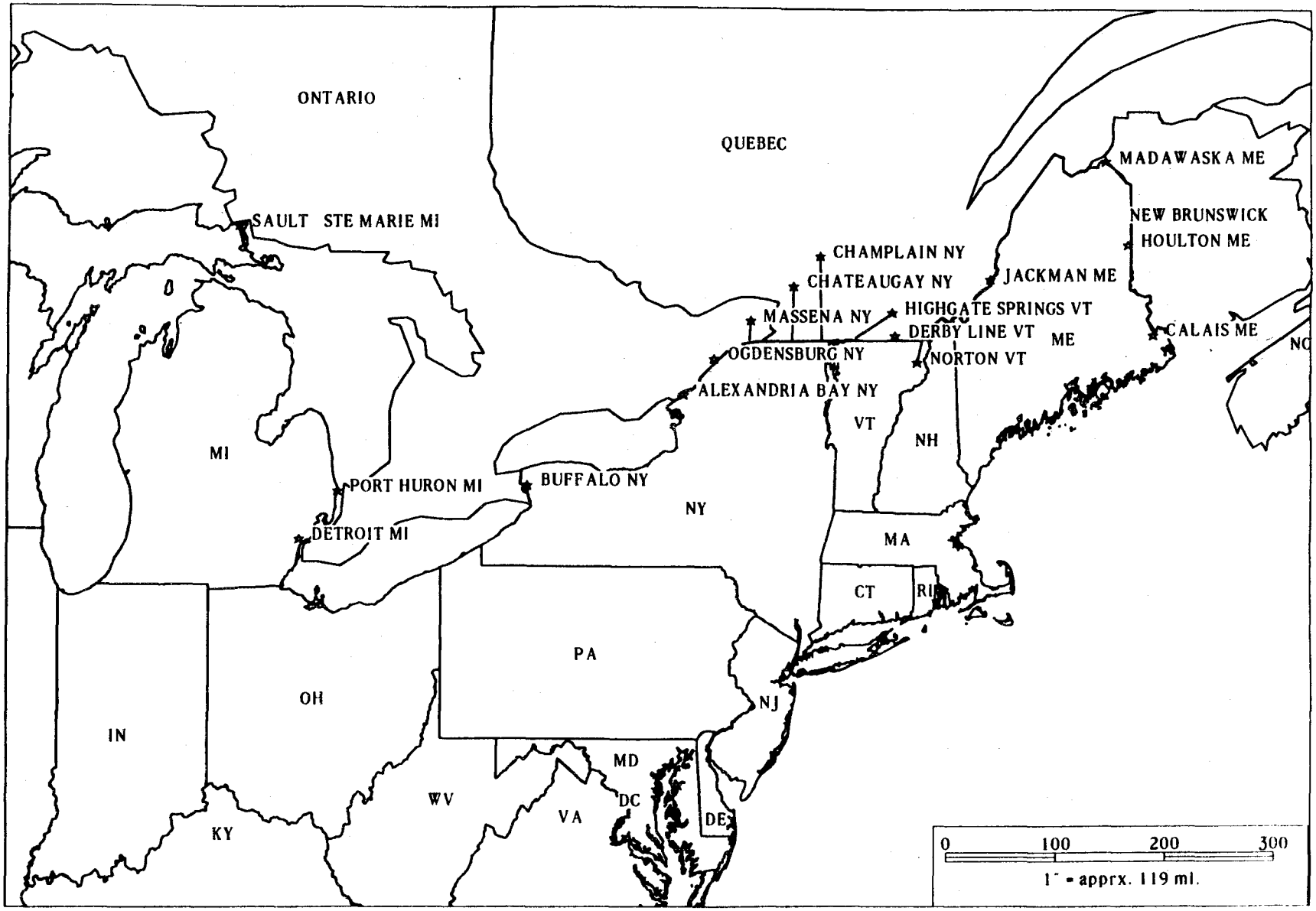


TABLE 1-3. U.S.-CANADA EASTERN BORDER CROSSING COMMERCIAL PORT GROUP* AND FRONTIER TOTALS, 1992 (1000's)

PORT GROUP/FRONTIER	PASSENGER	COMMERCIAL	TOTAL
CALAIS	3844	147	3991
JACKMAN	631	167	798
HOULTON	2617	200	2817
MADAWASKA	5274	106	5380
OTHER	75	7	82
MAINE FRONTIER	**12441**	**627**	**13068**
HIGHGATE SPRINGS	2046	183	2229
DERBY LINE	2180	138	2318
NORTON	539	44	583
CHAMPLAIN	3607	495	4102
MONTREAL SO. FRONTIER	**8373**	**859**	**9232**
OGDENSBURG	1077	49	1126
MASSENA	2537	74	2611
ALEXANDRIA BAY	1606	291	1897
CHATEAUGAY	555	17	571
EAST N.Y. FRONTIER	**5774**	**431**	**6205**
NIAGARA FRONTIER	**18615**	**1653**	**20268**
DETROIT	13391	1948	15339
PORT HURON	5626	831	6458
SAULT STE. MARIE	3416	79	3495
MICHIGAN FRONTIER	**22433**	**2858**	**25291**
EASTERN GRAND TOTAL	**67636**	**6428**	**74064**

*Port group consist of several crossings, as identified in Profile Appendicies 1-5.

of these crossings are over navigable waterways that require clearances of some 150 feet above water. At the South Montreal and Maine frontiers the crossings are most often land based.

1.2 MAJOR PORTS OF ENTRY AND BORDER CROSSING FACILITIES

The border crossing facilities vary widely in terms of ownership, organizational structure, clientele, capacity, investment cost and operation. This is true across frontiers and within specific frontier regions. The following sub-sections briefly summarize the major facilities by frontier. Individual appendices have been compiled by Frontier and provide detailed profiles on individual ports and crossings throughout this region. Maps, photographs, plot plans and traffic data are included for most of the major ports of entry.

1.2.1 Michigan Frontier[4]

The principal Michigan crossings are at Detroit-Windsor and Port Huron-Sarnia, although a fairly large volume of traffic also crosses at Sault Ste. Marie. For the highway mode, there is a privately owned four-lane bridge at Detroit called the Ambassador Bridge. The bridge was built in 1927 and is 1.7 miles long, including the approaches. It crosses the Detroit River, which is navigable by ocean-going vessels. The Ambassador Bridge crossing is the busiest total traffic and busiest commercial crossing on the U.S.-Canada border, with 8.201 million bi-directional vehicles in 1992 including 1.701 million trucks. Detroit also has a two lane auto and truck tunnel, which is owned by the cities of Detroit and Windsor and operated by a private company which previously held 60 year leasehold rights. The facility is 5135 feet long and was opened in 1930. The tunnel carried 7.515 million vehicles bi-directionally in 1992, including .300 million trucks. The tunnel clientele is more shopping and commuter oriented than the Ambassador Bridge, and is located in the immediate center of each city's downtown business district. While the Ambassador Bridge is just a few miles away from the center of downtown, it carries more inter-regional traffic than does the tunnel. Table 1-4 summarizes traffic levels through this frontier for the last four calendar years, distinguishing between passenger and commercial vehicles.

Detroit also features a major railroad tunnel owned by the Canadian Pacific and Canadian National railroads. The tunnel is currently being deepened to accommodate tri-level and high cube box cars; however, the City and Canadian Pacific are seeking outside funds for double stack capability, either in the existing tubes or a new facility.

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[4]Traffic data may be from two sources, from U.S. and Canadian Customs data or from facility operator data. Tables 1-3 through 1-8 are based on Customs data. Where possible, operator data are used in the text to provide a second estimate of flow. This occurs for the Michigan, Niagara, and Eastern New York frontiers.

TABLE 1-4. MICHIGAN FRONTIER TWO-WAY TRAFFIC TOTAL (000's)

YEAR	AUTOS	TRUCK/BUS	TOTAL VEHICLES
1989	16,613	2,320	18,933
1990	19,657	2,853	22,240
1991	22,205	2,542	24,747
1992	22,433	2,858	25,291

Norfolk Southern owns a railroad barge ferry at Detroit-Windsor which carries rail traffic for all lines that will not fit through the tunnel. Following completion of the partial deepening of the rail tunnel, the ferry will be terminated. A truck ferry for hazardous goods also operates at Detroit-Windsor.

The Blue Water Bridge which connects Port Huron, Michigan to Sarnia, Ontario, is an 8021-foot, two-lane bridge crossing the St. Clair River, a navigable waterway on the St. Lawrence Seaway System. The bridge, built in 1938, is already at capacity and a second span is currently being designed. A $50.0 million toll and inspection plaza was recently constructed on the U.S. side. The bridge is owned and operated by the Michigan Department of Transportation on the U.S. side, and by the Blue Water Bridge Authority on the Canadian side. The Blue Water Bridge carried 6.051 million vehicles in 1992, including .825 million trucks. Port Huron also has a major rail tunnel owned by Canadian National.

The International Bridge at Sault Ste. Marie, Michigan and Ontario, is owned and operated by the International Bridge Authority, an entity of the State of Michigan with unofficial Canadian representation. The bridge was opened in 1963 and consists of several spans covering some two miles over the Soo Locks and St. Mary's River. Traffic totaled 3.503 million vehicles in 1992 including .072 million trucks. The clientele is primarily local traffic between the two sister cities. The Sault also has a railroad bridge and the Soo Locks on the Great Lakes St. Lawrence Seaway System.

1.2.2 Niagara Frontier

The Niagara frontier consists of the Peace Bridge at Buffalo, and a major rail bridge operated by Canadian Pacific; and three highway bridges and one rail bridge at Niagara Falls. All of these facilities are within 20 miles of each other.

The Peace Bridge was opened in 1927 and is owned and operated by the Buffalo and Fort Erie Public Bridge Authority, an entity of the State of New York with Canadian representation. The bridge is 3580 feet long and has three lanes including a center lane which is reversible to accommodate traffic in either direction. In 1992 the bridge carried 8.142 million vehicles, including .950 million trucks.

The Peace Bridge Port of Entry is part of a critical economic corridor between Ontario and New York. The major infrastructure issue at this location is with regards to the inadequate truck inspection facilities. Plans and negotiations to add an off-site truck inspection facility have ben ongoing for over a year, keeping the Peace Bridge the highest priority on GSAs "top ten" list for Border station improvements. At present, the Buffalo and Fort Erie Public Bridge Authority (BFEPBA) envisions a pre-arrival truck yeard in Canada. The 1993 Niagara Frontier U.S.-Canada Bridge Study Phase I report estimated that the cost of delays experienced by passenger and commercial vehicles is about $12 million per year.

The three highway bridges at Niagara Falls are owned and operated by the Niagara Falls Bridge Commission, an entity created by the U.S. Congress. The Commission is composed of U.S. and Canadian representatives although there is no Canadian authorizing legislation.

Table 1-5 summarizes traffic levels through this frontier for the last four calendar years, distinguishing between passenger and commercial vehicles.

TABLE 1-5. NIAGARA FRONTIER TWO-WAY TRAFFIC TOTAL (000's)

YEAR	AUTOS	TRUCK/BUS	TOTAL VEHICLES
1989	14,729	1,442	16,171
1990	18,455	1,633	20,088
1991	19,385	1,510	20,895
1992	18,615	1,653	20,268

The Rainbow Bridge was opened in 1941 and is 1450 feet long and some 202 feet above the Niagara River gorge. The bridge is four lane and is almost exclusively reserved for automobile traffic. Most traffic is intra-region. In 1992, 4.618 million vehicles used the bridge.

The Whirlpool Rapids Bridge consists of an upper rail deck and a lower two-lane highway deck. The bridge is 1080 feet long and is 245 feet above the Niagara River. The approaches to, and egresses from the highway bridge on each side are extremely congested. Rail traffic on the upper deck is limited to two Amtrak trains per day. The bridge, built in 1897, is reserved primarily for auto traffic; and in 1992, carried 2.475 million vehicles. Traffic is very intra-regional in nature and heavily tourist oriented.

The Lewiston-Queenston bridge was rebuilt in 1962 and consists of four traffic lanes. The bridge is 1600 feet long and 370 feet above water. In 1992 the bridge carried 5.336 million vehicles including .642 million trucks. The bridge is more inter-regionally oriented than the other two Niagara Falls bridge.

1.2.3 Eastern New York Frontier

The Eastern New York frontier consists of four commercial ports of entry. Three are highway bridge crossings at Thousand Islands (or Alexandria Bay), Ogdensburg, and Massena. Each bridge is under separate ownership and operation. The other commercial port is a relatively small land crossing in Chateaugay.

The Thousand Islands Bridge and Administrative operations facility are owned by the St. Lawrence Seaway Authority in Canada and by the Thousand Islands Bridge Authority (TIBA) in the United States. The TIBA operates in both countries. The bridge consists of several spans and roadways which stretch over some 8 1/2 miles. The actual international span was built in 1938. In 1992, the bridge carried 1.897 million vehicles including .291 million trucks. Auto traffic is primarily inter-regional.

The Ogdensburg-Prescott International Bridge is owned and operated by the Ogdensburg Bridge and Port Authority, a State of New York entity with U.S. only representation. The bridge is 7377 feet long and carries two lanes of traffic. The bridge was opened in 1961. Traffic totaled .797 million vehicles in 1992, including .049 million trucks.

The Seaway International Bridge at Massena is considered the economic lifeline of northern New York, serving the region between New York State's North Country and Ontario, Canada. It consists of two main spans. The north span is owned by the Canadian St. Lawrence Seaway Authority (SLSA), a Canadian crown corporation. The south span is owned jointly by the SLSA and the U.S. St. Lawrence Seaway Development Corporation. Both spans are operated and maintained by the Seaway International Bridge Corporation, a federal crown corporation and wholly owned subsidiary of the SLSA. The bridges were built in 1958 and 1962 and the overall length of the crossing is 2 miles. The north span is 5330 feet long, while the south span is 3480 feet long. In 1992, the bridge carried 2.768 million vehicles, almost half of which crossed free of charge under Indian rights.

Several formal meetings have been held regarding physical problems at this bridge including 70,000 pound weight restrictions, delays, long range capability and safety of the bridge. Operationally, complex problems exist with the Akwesasne Indian Reservation through which the bridge passes. Issues with the Reservation culminated in a blockading of the bridge several years ago and have created significant barriers to operations and enhancements. Proposals by the St. Lawrence Board of Legislators have been set forth requesting federal aid assistance for a new bridge to address travel restrictions concerns at this crossing. The recent increase in violence and smuggling that transpires through this location has been causing additional safety concerns.

One of the current concerns regarding inspectional services is the provision of adequate customs and immigration staff on each side of the border, to provide quick responses to peaks in traffic. Table 1-6 summarizes traffic levels through the frontier for the last four calendar years, distinguishing between passenger and commercial vehicles.

1.2.4 Montreal South Frontier

Four principal commercial land ports of entry and fourteen smaller crossings extend east to west from Pittsburgh, New Hampshire to Champlain, New York, comprising the Montreal South Frontier. Two commercial ports of entry, Champlain and Highgate Springs, are located adjacent to the New York and Vermont sides of Lake Champlain. Two of the smaller crossings in the port of Highgate, Alburg and Alburg Springs, sit on a 27-mile-long peninsula which extends from the Quebec Province border down the middle of Lake Champlain. The station at Alburg, Vermont/Noyan, Quebec, is one of the few jointly owned facilities on the U.S. Canadian border, and in the country.

TABLE 1-6. EAST NEW YORK FRONTIER TWO-WAY TRAFFIC TOTAL (000's)

YEAR	AUTOS	TRUCK/BUS	TOTAL VEHICLES
1989	3,260	313	3,573
1990	4,407	400	6,086
1991	5,683	403	6,086
1992	5,774	431	6,205

The ports of Derby Line and Norton, also designated commercial ports, are located in the central to eastern region of Vermont.

The Highgate Springs border crossing facility is located on U.S. Interstate 89, a four-lane divided highway, on the eastern shore of Lake Champlain. Considering the impending completion of design plans for a new and improved facility, the Highgate facility has recently been removed from GSA's "top ten" improvement priority list. Highgate Springs is principally a land border port. Several bonded warehouses and a Foreign Trade Zone in St. Albans, Vermont are also serviced by inspectional staff from Highgate Springs. The St. Armand-Phillipsburg facility, on the Canadian side of Highgate Springs, is a newly constructed, modern facility.

The Derby Line border crossing is located in mid-Vermont on U.S. Interstate 91. In 1992 this crossing served over 2.3 million vehicles. Capacity at this port of entry exceeds its current level of activity.

The Champlain port of entry is situated on U.S. Interstate 87 in New York, and Route 15 in Canada, a major route that leads to Montreal and Quebec City. Champlain is among the largest commercial operations on the U.S.-Canadian border. The volume of imports at this port is typically exceeded only by Detroit and Buffalo.

Currently, commercial trucks have to cross from the right lane of the New York Interstate to the extreme left lane to drop off export papers to United States Customs Services (USCS)

and then cross back over a maximum of seven traffic lanes to reach the primary inspection area in Quebec. The congestion caused by this activity has generated complaints at the national and local levels regarding unsafe and slow traffic at this site.

During 1992, 9.23 million vehicles crossed through the Montreal South ports of entry. This represents 12.5 percent of the 74 million vehicles that crossed through the eastern region. The port of Champlain serviced 44 percent of this traffic while the ports of Derby Line and Highgate each serviced about 25 percent or 2.2 million vehicles. Norton handled less than 7 percent of this traffic. On average, passenger vehicles constitute 92 percent of total vehicular traffic through the Montreal South frontier. Table 1-7 summarizes traffic levels through this frontier for the last four calendar years, distinguishing between passenger and commercial vehicles.

TABLE 1-7. MONTREAL SOUTH FRONTIER TWO-WAY TRAFFIC TOTAL (000's)

YEAR	AUTOS	TRUCK/BUS	TOTAL VEHICLES
1989	5,975	588	6,563
1990	7,076	752	7,828
1991	8,486	835	9,321
1992	8,373	859	9,232

1.2.5 Maine Frontier

The Maine Frontier consists of three land commercial ports of entry and nineteen non-commercial, staffed crossings throughout the state of Maine. In addition, there are hundreds of unstaffed crossings monitored by the Border Patrol, a division of INS. From east to west, the commercial ports are 1) Ferry Point, the easternmost landing crossing located in Calais; 2) Houlton, midway along the Maine-New Brunswick border; and 3) Jackman, the only major crossing along the Maine-Quebec border.

Perhaps one of the most urgent problems in the entire eastern border region is the severe congestion at the Ferry Point, Calais-St. Stephen, New Brunswick, crossing. The U.S. inspectional facility at this location was built in the early 1930s and is functionally obsolete. Due to the congestion and safety concerns associated with inadequate international border crossing facilities, this station has been ranked high on GSA's "top ten" priority list for several years. Physical expansion constraints exist due to the close proximity of both stations to their respective central business districts, and to the bridge. During the peak summer season, traffic in both directions often backs up for several miles. These problems are exacerbated by the total inadequacy of the existing facilities for inspection of truck traffic. Congestion and safety problems at this location have been compounded over the last several years, as traffic levels have increased significantly.

The St. Stephen facility in New Brunswick has recently completed extensive renovations, but, as with its U.S. counterpart, the close proximity to the bridge and to the central business district virtually eliminates expansion options.

Madawaska and Van Buren are non-commercial crossings located about 23 miles apart on the northern border of Maine. Madawaska has also been listed on GSA's "top ten" priority list for needed physical improvements. The primary concern with both the U.S. and Canadian facilities is the traffic congestion caused by the limited size of the inspection facilities. During the peak summer season, traffic in both directions is backed up for several miles. GSA recently advised the Federal Inspection Services (FIS) to drop this station from the top ten priority list because the present location is landlocked and the State of Maine has no plans to provide for the relocation of this bridge in the future. The FIS have since asked GSA to consider reconfiguring the station with one that utilizes the existing roadway and site in a way that alleviates the worst of the congestion. In addition, the FIS are requesting that a two-bay truck inspection facility be constructed on-site.

The Maine frontier handled 17.64 percent of the 1992 international traffic through the eastern region, or 13.07 million vehicles in 1992. Approximately 4 million vehicles, or 30.5 percent of traffic through the Maine frontier crossed through the eastern most port of Calais-St. Stephen. The port of Houlton-Woodstock, located about half-way up the Maine-New Brunswick border, handled 2.82 million vehicles, 21.6 percent of the two-way traffic through the Maine frontier. Two-way traffic through the northern ports of Madawaska and Van Buren is in excess of 5.3 million annually, approximately 41.2 percent of this frontier's traffic. Passenger traffic constitutes 98 percent of total traffic through these two stations. The port of Jackman-Armstrong, the only commercial port on the Maine-Quebec border, handled .789 million vehicles in 1992. Overall, the percent of passenger traffic through the Maine frontier was 95.2 percent. Table 1-8 summarizes traffic levels through this frontier for the last four calendar years, distinguishing between passenger and commercial vehicles.

TABLE 1-8. MAINE FRONTIER TWO-WAY TRAFFIC TOTAL (000's)

YEAR	AUTOS	TRUCK/BUS	TOTAL VEHICLES
1989	9,079	500	9,579
1990	10,918	590	11,508
1991	12,663	575	13,238
1992	12,441	627	13,068

1.3 HIGHWAY TRAFFIC

While there are some variations in interpreting commercial and private passenger vehicle traffic figures maintained by Customs, they generally refer to commercial and passenger vehicles, respectively. For the Eastern region, there was a total of 74.064 million vehicle crossings in 1992. Private passenger vehicles, or automobiles accounted for 67.636 million of this traffic, and commercial vehicles, usually trucks, accounted for the remaining 6.428 million vehicles. Total traffic levels in the East increased by 33.9 percent between 1989 and 1992. Automobile traffic increased 35.0 percent during this time period, and truck traffic increased 24.2 percent. However, it should be noted that auto traffic declined at many U.S.-Canada border crossings in both the East and West during 1992, and that this decline has continued into 1993.

Border area highway needs are considerably dependent upon the volume of traffic crossing through the area ports. The traffic data indicate that automobiles account for over 91 percent of the total traffic region-wide, and in all cases accounts for more than 75 percent of any individual crossing's traffic levels. These data emphasize the need to weigh the effect of automobile traffic on total traffic levels. Automobile traffic is far more volatile than truck traffic, with several large fluctuations over the last 15 years.

As with trade levels, the vehicle traffic is highly concentrated at several frontiers, and at specific crossings within those frontiers. The Michigan frontier accounts for 25.291 million of the total vehicles, or 34.1 percent of the eastern total. Michigan accounts for 44.5 percent of the total truck traffic in the East, or 2.858 vehicles. Auto traffic at the Michigan frontier increased by 35.3 percent between 1989 and 1992, and truck traffic increased 23.2 percent. Niagara is the second busiest crossing with 20.268 million vehicles in 1992, or 27.4 percent of the total. Truck traffic in Niagara totaled 1.653 million vehicles or 25.7 percent of the eastern total. Niagara auto traffic increased 26.4 percent from 1989 to 1992, and truck traffic was up 14.6 percent. The Michigan and Niagara frontiers together account for 61.5 percent of the total eastern traffic, and 70.2 percent of the eastern truck traffic. The Maine frontier accounts for an additional 12.441 million autos and .627 million trucks.

U.S. Customs reports data at the port level, which for many ports, includes jurisdiction over multiple border crossing stations. As such, detailed Customs' traffic data is not always available at the individual crossing level. Data provided by individual crossing operators must be used to evaluate traffic levels at individual crossings. These data also vary in terms of how autos and trucks are classified. For instance, prior to 1991, the Niagara Falls Bridge Commission (NFBC) reported pickup trucks as trucks, while most other crossings and the NFBC now consider pickups to be autos.

The operator data indicates that the Ambassador Bridge in Detroit is the busiest crossing on the U.S.-Canada border. Total traffic at the Ambassador in 1992 was 8.201 million vehicles, with truck traffic of 1.701 million vehicles representing 20.7 percent of the bridge's total traffic. Truck traffic at the Ambassador Bridge is almost double that of any other crossing on the U.S.-Canada border. Both auto and truck traffic at the Ambassador have increased steadily since 1987, with a total traffic increase of 27.6 percent. Traffic was up 8.5 percent between 1991 and 1992. The Peace Bridge at Buffalo is the second busiest

crossing on the U.S.-Canada border, with total 1992 traffic of 8.142 million vehicles including .950 million trucks. Auto traffic at the Peace Bridge was down slightly in 1992; however total traffic growth since 1987 has equaled 15.4 percent. The Blue Water Bridge at Port Huron has experienced the fastest growth since 1987 for a major crossing. Auto traffic is up 55.0 percent since 1987 and truck traffic is up 49.5 percent, for a 1992 total of 6.05 million vehicles. However, auto traffic was down in 1992. Many other crossings in the East also experienced rapid growth between 1987 and 1991, followed by some declines in 1992 and 1993.

The declines in auto traffic are related to a decline in Canadian shopping activity in the U.S. This decline, following several years of major increases, is due to a decline in the value of the Canadian dollar, improvements in Canadian retail competitiveness, Sunday shopping in Ontario, an effort by the Canadian government to discourage U.S. shopping trips, and the Canadian recession. At the same time, increases in truck traffic are thought to be due to continuing specialization, rationalization, and integration of the U.S. and Canadian economy with resulting increases in the demand for small and frequent just-in-time deliveries of production inputs and finished goods.

In analyzing truck traffic statistics, it is also important to understand that a significant portion of traffic is not related to U.S.-Canada trade. These trips include U.S. movements from the Midwest to the Northeast that transit Ontario, Canadian movements from the East to West that use the U.S. highway system, and the movement of overseas export/import goods through Northeast U.S. and Eastern Canadian ports. This traffic is not reflected in U.S.-Canadian trade statistics.

Table 1-9 provides additional data pertaining to activity measures at the consolidated port of entry level. Using U.S. Customs data, the number of merchandise releases and merchandise exams are provided for 1992; and using INS data, the number of persons entering at each port level is provided.

1.4 RAILROAD TRAFFIC

Railroad border crossing traffic has been relatively stable over the last four years. This traffic relates not just to U.S.-Canada trade, but also to U.S. and Canadian trade with offshore trading partners that include intermodal rail links across the border. Key movements include Asian goods bound for Montreal and Toronto markets via U.S. West Coast ports and U.S. rail cross-country, and U.S. Midwest exports and imports with Europe that move via Montreal/Halifax ports and rail across North America.

Rail traffic data are not yet available for entry to Canada, but U.S. entry data are available for 1989 to 1992. In 1992, a total of 15,472 trains entered the U.S. from Canada, including 610,221 rail cars. In 1989, a total of 652,750 rail cars entered the U.S. from Canada. In 1992, the Michigan frontier accounted for 319,826 rail cars, or 52.4 percent of the total, while the Niagara frontier accounted for 131,114 rail cars, or 21.5 percent of the total. Traffic at the Niagara frontier was down 14.3 percent from 1989, while traffic at the Michigan frontier was down 6.2 percent. This decline is related to the general economic recession in North America and Europe.

TABLE 1-9. BORDER ACTIVITY MEASURES ENTRY TO U.S.

PORT	1992 FY MERCHANDISE RELEASES BY LAND[1] (000's)	1992 FY MERCHANDISE EXAMS BY LAND[1] (000's)	1992 PERSONS ARRIVING[2] (000's)
Detroit	1,000	131	26,020
Port Huron	692	81	8,628
Sault St. Marie	75	29	5,566
Michigan Frontier	**1,767**	**241**	**40,214**
Buffalo/Niagara Frontier	**1,428**	**363**	**26,676**
Thousand Islands	141	48	2,966
Ogdensburg	33	19	1,533
Massena	27	15	3,938
Eastern New York Frontier	**201**	**82**	**8,437**
Calais	81	84	6,912
Houlton	60	31	2,508
Madawaska	9	16	4,039
Jackman	45	27	325
Maine Frontier	**195**	**158**	**13,784**
Norton	38	38	394
Derby Line	71	13	2,073
Richford	7	10	435
Highgate Springs	97	107	1,287
Champlain	380	195	4,739
Montreal South	**593**	**363**	**8,928**

[1]U.S. CUSTOMS WORKLOAD SUMMARY REPORT 10/26/92

[2]U.S. INS REPORT

1.5 PHYSICAL BORDER CROSSING CHARACTERISTICS

Any analysis of the border crossings must consider the crossing itself, the related border area transportation infrastructure, and the transportation corridors of which the crossing is an element. Within each crossing element problems can arise due to either physical infrastructure issues or institutional/operational problems, or both. The key elements which need to be evaluated include the 1) crossing itself; 2) immediate access/egress roads and connections to the crossing; 3) toll plazas and other outbound constraints; 4) primary inspection facilities and operating constraints for all involved agencies; 5) secondary inspection facilities and operating constraints; and 6) border area transportation infrastructure and continental transportation corridors. The above elements must be evaluated for each direction of travel, and for both automobile and truck traffic. Obstacles and requirements at the highway crossings relate to almost all of the above elements. Key issues by element are summarized in the following sections.

1.5.1 Highway Mode

1.5.1.1 Highway Crossings - While the crossing themselves have adequate capacity at most locations, there are several crossings in each mode that require additional physical capacity. Chapter 2 identifies plans to address these needs.

1.5.1.2 Plaza Capacity - Many of the eastern crossings have major problems with plaza capacity for either primary or secondary inspections by the inspection services on one side and/or the other. At the Blue Water Bridge the State of Michigan has just completed a $50 million project to increase the toll booth, primary inspection, and secondary truck inspection parking areas. Primary inspection booths are being increased from 7 to 12 on the U.S. side. At the Ambassador Bridge in Detroit, Michigan, the GSA has recently completed a new truck primary and secondary inspection facility adjacent to the bridge. This facility has 6 truck primary lanes and parking for 121 trucks with 18 bays. By moving truck primary inspection off the bridge plaza, space has been freed up to add 9 auto primary inspection booths for a total of 20. On the Canadian side of the Ambassador Bridge, truck secondary inspection was recently moved three miles away to an off-site facility freeing up space for additional auto and truck primary inspection booths and a new auto secondary inspection facility that was dedicated in July, 1993. The Detroit-Windsor auto tunnel also has severe primary and secondary auto inspection limitations on the Canadian side, and space is very restricted.

At the Niagara frontier there also is a number of toll plaza and/or primary/secondary inspection constraints. At the Peace Bridge the toll capacity has recently been increased by changing to one-way toll collection. Primary inspection booths are the constraining factor at this crossing. The 12-booth capacity is currently exceeded at peak travel times. Truck secondary capacity on the U.S. side is especially inadequate; however, previous plans for an off-site secondary facility have been dropped despite Intermodal Surface Transportation Efficiency Act (ISTEA) funding.

Plaza capacity is generally adequate at the Eastern New York crossings with some limited needs for additional toll and/or primary inspection booths. At the Maine and South Montreal frontiers, there is a number of requirements for more modern and expanded primary inspection and auto secondary facilities. These needs are especially strong on the U.S. side where many of the U.S. inspection service buildings are 1930's era wood structures with few of the specialized rooms and equipment available at other crossings in the East. The Ferry Point crossing in Calais, Maine, presents the most urgent congestion and safety problem in the Maine and Montreal South frontiers. Appendices 1-5 provide details of the predicament at this port of entry.

1.5.1.3 Highway Connections - Perhaps the greatest unfunded need on the eastern border relates to connecting border crossings to area expressways and major roads, and widening and improving area highways and city streets in the vicinity of the crossing. These needs are especially great at the Niagara and Michigan frontiers in the U.S. where area highways require widening, and crossings need better connections to area roads. In the Montreal South frontier, the highway connection problem exists on the Canadian side.

At the Niagara frontier the most immediate needs relate to improvements to city streets at the three Niagara Falls crossings. At the Peace Bridge there is also a fairly immediate need for a Southtown Connector in Buffalo and a need before the year 2020 for widening of I-190 to six and eight lanes depending on the location. On the Canadian side, the Queen Elizabeth Expressway will need to be expanded to six lanes before the year 2020.

At the Michigan frontier, the biggest unmet need relates to connections from the Ambassador Bridge to adjacent interstates, and the need for improvements to interstates in the vicinity of the bridge. Access to and exit from the private Ambassador Bridge is via city streets which lead to interstate ramps. There is a major need for the bridge to be connected directly to the I-96/I-94 and I-75 interstate systems. In addition, I-94, which carries some 12,000 trucks per day, 6000 of which are U.S.-Canada bound, is in need of widening and major rebuilding due in large part to the volume of pass-through international traffic. Access/egress roads and connections with the Detroit-Windsor Tunnel also require improvements on both sides of the border.

The most pressing highway connection infrastructure issue in the Montreal frontier relates to the transportation corridor serving traffic through the port of Highgate Springs. The highway structure and roadbed capacity of Route 133 in St. Armand-Philipsburg is of particular concern. Approaching the Highgate Springs port from the U.S. is Interstate 89, a four-lane divided highway. Entering Quebec, this Interstate becomes Route 133 which is a rural two-lane route with a third "suicide lane" in the middle. The third lane services northbound traffic in some sections and southbound traffic in other sections.

A highway transportation committee based in St. Albans, Vermont is researching options and alternative funding methods to upgrade this corridor. Some commercial activity is being diverted to eastern New York through the Champlain port of entry, which is already busy and often congested, to avoid Route 133 through Highgate Springs. There is a need for the Canadian Government to upgrade Route 133 as it connects to I-89 which is part of the

National Highway System.

1.5.1.4 Trade and Transportation Corridors - The Niagara and Michigan frontiers are at the center of the major trade corridors between the U.S. and Canada, and the upper Midwest is responsible for the largest portion of U.S.-Mexico trade aside from that which originates in Texas and California. As such, the transportation corridors between Montreal, Toronto, Buffalo, Southeast Michigan, Chicago, and Laredo, where most Mexican freight crosses the border, are critical to an integrated North American market. While most of infrastructure already exists for these corridors, there are some areas where more direct interstate routings are necessary, and other areas where various improvements to existing interstates are required.

More specifically, there are several key corridors from an industry standpoint. The corridor from Toronto to Detroit to Tennessee and on to Florida by way of Ontario 401 and I-75 is one of the heaviest travelled truck routes in North America. It is also a critical just-in-time route for the auto industry and has been referred to as an "assembly line on wheels" because of the number of auto supplier shipments on this route. The biggest bottlenecks on this system are at the border crossing itself where, in Canada for about three miles, it is not limited access divided highway, and in the U.S. the Interstate does not connect directly to the bridge access and egress plazas. In addition various improvements in the Detroit metro area are required.

A second Toronto to U.S. corridor involves movements through Detroit or Port Huron and on to Chicago, then west and south to Texas and Mexico. This corridor includes the 401 expressway in Canada and I-94 between Detroit, Chicago, and points to the West. Again, the principal bottlenecks are at the border itself due to a lack of direct interstate connections. This corridor also requires major reconstruction in the Detroit area due to age and high volumes of international and domestic truck traffic. The optional route from Toronto to Chicago involves the 401 and 402 expressways in Canada, with a crossing at Port Huron and travel to Chicago via I-69. This route is far less congested, features newer infrastructure, and includes direct expressway access to both sides of the Blue Water Bridge. However, this "I-69 corridor" does not continue on to the south and Laredo. Several interest groups are promoting the idea of extending this interstate through St. Louis, Little Rock and Texas. In order to obtain a more direct interstate alignment between the Midwest and Texas, several hundred new miles of interstate would be necessary in the South.

In the Niagara area there is also a heavy flow of automobile industry and other traffic between Montreal/Toronto and the Eastern U.S. The Peace Bridge at Buffalo is at the center of this major transportation corridor which includes the QEW in Canada and several U.S. interstates including the I-90 in the Buffalo area. Interstates I-90 and I-190 in the Buffalo area will need to be expanded to 6 and 8 lanes before the year 2020 according to the Niagara Frontier March 1993 report. Buffalo area officials have also pointed out growing trade levels between Canada and the Washington D.C./Baltimore area and the Southeast and suggested that US 219 requires an upgrade to interstate status.

In eastern New York, there has been a long time interest in upgrading Highway 37 to four

lanes. This highway runs across the top of New York state, connecting to the Seaway International Bridge and to a smaller crossing at Fort Covington. In Canada, there has been strong interest in a much delayed project to upgrade Highway 16 between Ottawa and Prescott to a four-lane highway.

Other trade and transportation corridors in the East include those connecting Ottawa, Ontario, to lower New York, with a principal crossing at Ogdensburg. Further north along the border of New York, the Seaway International Bridge connection is critical to the economic vitality and prosperity of the St. Lawrence County, New York, as well as the North Country region of New York state. This international crossing has attracted industry to the rural region and has led to the creation of numerous jobs.

The two significant corridors in the Montreal South frontier linking Montreal, Quebec, to the Eastern U.S via Vermont are Derby Line and Highgate Springs. Both of these crossings are interstate highways in the U.S., I-91 and I-89, respectively, but only Derby Line connects to a major Canadian Highway, Route 55.

As noted in the previous section, an important highway infrastructure issue in the Montreal South frontier is the inadequate transportation corridor serving traffic into Canada, through the port of St. Armand-Phillipsburg, which corresponds to Highgate Springs. At this crossing, four lane U.S. Interstate 89 connects to rural two lane Route 133, which has a third "suicide lane" in the middle. The third lane presents a safety concern as it serves northbound traffic in some sections and southbound traffic in others. The deficient highway structure and roadbed capacity of Route 133 in St. Armand-Philipsburg causes commercial traffic to divert west to U.S. Interstate 87, at Champlain, New York. A highway transportation committee based in St. Albans, Vermont, is researching options and alternative funding methods to upgrade this corridor.

In eastern Maine, the Houlton port of entry on Interstate 95 is a major corridor linking the Canadian maritime provinces with the Northeastern U.S. This corridor connects to Canadian Route 2, the Trans Canada Highway. Advocates of developing this corridor envision it becoming an international expressway for Newfoundland to Miami, now calling it the "Atlantic Expressway."

1.6 RAIL MODE

There are two major infrastructure issues which affect the rail mode, both at the Michigan frontier. These issues relate to vertical clearance restrictions at the two rail tunnels between Michigan and Ontario. Rail barges have traditionally been used to cross the Detroit and St. Clair Rivers at Detroit and Port Huron, Michigan, when the tunnels can not be used due to insufficient clearance for tri-levels (auto carriers), high cube box cars, and traditional TOFC equipment. These rail barges add 12 to 24 hours and $300 to 400 per rail car to cross-border trips. They also result in the 12/100th's of 1 percent U.S. harbor maintenance fee that is applied to the value of any cargo on the rail cars. The tunnel restrictions and rail barge inefficiencies have also precluded the introduction of double stack rail service at these crossings. These crossings are on the most direct routes between Chicago and Montreal and

are critical to the efficient movement of Midwest goods between Europe and the U.S. via the Port of Montreal. The Montreal trade route is the least expensive and fastest route between the U.S. Midwest and Europe and is critical to export competitiveness.

In eastern New York, existing rail bridges do not have clearance problems. However, at Niagara Falls, there have been discussions about removing the rail deck from the Whirlpool Rapids Bridge. Potential increases in rail traffic at the Niagara crossings is also leading to interest in grade separations for lines carrying this freight.

1.7 WATER MODE

The Great Lakes and St. Lawrence Seaway System form a critical transportation link between the U.S. and Canadian hinterlands and the rest of the world. The physical international boundary line between Canada and the U.S. also runs down the middle of much of this system. The Great Lakes and St. Lawrence Seaway System carries a large volume by weight of freight between these two countries but has fallen into disuse because of obsolete locks and other infrastructure. The system requires hundreds of millions of dollars of upgrades in order to once again provide the hinterlands of Canada and the U.S. with a degree of transportation based competitive advantage.

At the Sault Ste. Marie, Michigan and Ontario, a major improvement requirement is with regards to locks, where a second 1000 foot lock is needed to back up the Poe Lock, the only one capable of accommodating 1000-foot ships today. This project has an expected cost of $411 million in inflated construction dollars as of October 1991, and has been authorized but not appropriated by the Congress. Under the Water Resources Act of 1986, the local share for this project is approximately 35 percent. The State of Michigan has been solicited for the local share because the lock is located in that state. However, Michigan has not been amenable to contributing 35 percent when only about 16 percent of the weight moving through the lock had a Michigan origin or destination.

The lock provides a good example of the problems with local funding of border crossings in general. A large volume of the traffic and benefit from a new facility accrues to gateway traffic which does not have its origin or destination in the state where the crossing is located. This is also true of the railroad tunnel projects discussed above, for the highway crossings discussed earlier, and for this particular lock project. For the Sault lock, 21.12 percent of the traffic tonnage has a Canadian origin or destination, while Minnesota accounts for 21.48 percent of the tonnage.

1.8 INTERMODAL TRANSPORTATION

Intermodal transportation across the U.S.-Canada border is increasing rapidly. While the border crossing itself relates to one specific mode, usually rail, many freight and passenger services across the border do in fact utilize more than one mode of transportation. Examples of intermodal services include the use of double stack intermodal trains, the use of roadrailer

services cross-border, and multimodal movements in which St. Lawrence Seaway or Great Lakes ships actually carry freight cross-border. Due to height restrictions at the rail tunnels under the Detroit and St. Clair Rivers of the Seaway System, most trailer-on-flat-car (TOFC) and all tri-level and high cube box cars must cross the river by rail ferry. Many of the intermodal freight movements across the border involve goods moving from Asia to Canada through U.S. ports, and from the U.S. Midwest to Europe through Canadian ports.

Regarding passenger rail, new high speed trains that would tie in with highway and air services are being considered, and a number of air-bus combinations are possible. For instance, a high speed rail line is being considered between Chicago and Toronto via Detroit, and the Detroit and Windsor airports could be enhanced by cross-border bus movements between the two facilities.

As is the case with individual modes of transportation, many of the barriers to more efficient cross-border transportation are institutionally oriented. Physical infrastructure needs do exist, however, such as at access roads to ports and terminals and intermodal terminal facilities. There is some difficulty in distinguishing international infrastructure from domestic facilities. In other words, intermodal terminals that service the cross-border market are more extensively utilized for domestic rather than for international freight, and oftentimes, key intermodal facilities are a great distance from the border. For example, the most important terminals for U.S.-Canada and U.S.-Europe movements are located in Chicago. In fact, railroads are trying to eliminate border terminals that exist solely because of the border, in order to operate across the border in as transparent a way as is possible.

Key intermodal freight terminals that are near the border are located at Detroit-Windsor, and in the Buffalo area. The Canadian National (CNR) operates the "MOTERM" intermodal facility at Ferndale, Michigan. This facility is a key interchange point for U.S.-Canada, U.S.-Europe, and Mexico-Canada international freight, but it primarily handles domestic U.S. freight. Access to the facility is via city streets, and the facility is near its capacity level. CN trains utilizing the terminal cross the border at CN's Port Huron tunnel, or use the ferry at Port Huron. CN operates 12 freight trains daily using the tunnel, and there are also 2 passenger trains per day at the Port Huron tunnel. Bi-directionally, some 290,000 cars crossed in 1988, with 180,000 using the tunnel, and 110,000 using the rail ferries. About 80,000 of the rail ferry cars used the CN ferry while some 30,000 used the CSX Port Huron ferry.

The other major Detroit area terminal is the Oak Yard, which is used by Canadian Pacific. Eight single stack container trains a day, six between Chicago and Toronto and two between Detroit and Toronto, use this terminal. CP has the rail contracts for most of the U.S.-Europe freight that moves through the Port of Montreal. A total of 359,600 bi-directional railcars used the crossing in 1991 and 1992, but the number of intermodal cars is not known. Access to this terminal is quite good with major interstates just a short distance away, although city streets are again used for the final access.

The State of Michigan is currently undertaking a major study to determine the need for and feasibility of a multi-user intermodal facility with better access to area interstates and rail lines. There is considerable railroad interest in such a facility.

At Buffalo, eight double stack trains per week were using the tunnel in 1991. CN operates six trains a week while NS operates two. In the eastern region, this double stack capability is the farthest west. It is the key crossing point for Asian cargoes entering the Ontario market via U.S. ports. K-Line, Maersk, APL, and Sea-Land all have double stack services that cross at this location. The intermodal terminals are, however, oriented to both domestic and international freight.

The key infrastructure issue for intermodal movements cross-border involves the height restrictions at Michigan border tunnels. Because of these height restrictions there is currently no double stack cross-border service in Michigan. Several trains that previously crossed single stack have been diverted to the Buffalo crossing because of double stack capability at the bridge crossing there. Canadian National is conducting preliminary construction on a new $150 million double stack tunnel at Port Huron, Michigan, and this will eliminate much of the problem. The City of Detroit is also seeking funds for double stack capability at the Detroit tunnel owned by Canadian National and Canadian Pacific. A second infrastructure issue related to increased intermodal rail traffic is the need for grade separations at the many highway crossings along these rail routes.

Intermodal rail facilities along the eastern U.S.-Canada border region are identified in Table 1-10. Intermodal facility locations are depicted in Figure 1-2.

1.9 INSTITUTIONAL CHARACTERISTICS

While physical infrastructure issues vary considerably from one crossing to another, most of the institutional issues are common across the various crossing locations. A lack of consistent policies and cooperation/coordination among federal agencies has often been identified as a significant impediment to the flow of trade and traffic across the borders.

Organizational, staffing, and operational procedures of the Federal Inspection Services on both sides of the border have been identified in numerous studies as being the largest cause of border crossing inefficiencies. Other institutional issues are 1) the variations in methods and sources of infrastructure funding; 2) the use of new technologies; 3) customs broker practices and nighttime hours; 4) border crossing fees; and 5) carrier and shipper knowledge of border crossing requirements.

TABLE 1-10. NORTHEAST U.S. INTERMODAL RAIL FACILITIES

CITY	STATE	RAILROAD(S)
BANGOR	MAINE	MAINE CENTRAL
PORTLAND	MAINE	MAINE CENTRAL, BOSTON & MAINE
BURLINGTON	VERMONT	CENTRAL VERMONT
BUFFALO	NEW YORK	CONRAIL
BUFFALO	NEW YORK	NORFOLK SOUTHERN
RETSOF	NEW YORK	GENESSE & WYOMING
ROCHESTER	NEW YORK	CONRAIL
SYRACUSE	NEW YORK	CONRAIL
BEDFORD PARK	ILLINOIS	CSX TRANSPORTATION
BENSENVILE	ILLINOIS	SOO LINES
BLUE ISLAND	ILLINOIS	IOWA INTERSTATE
CHICAGO	ILLINOIS	CHICAGO & NORTH WESTERN
CHICAGO	ILLINOIS	GRAND TRUNK WESTERN
CHICAGO	ILLINOIS	UNION PACIFIC
CHICAGO	ILLINOIS	WISCONSIN CENTRAL
CHICAGO (LANDERS)	ILLINOIS	NORFOLK SOUTHERN
CHICAGO, 47TH ST.	ILLINOIS	CONRAIL
CHICAGO, 51ST ST.	ILLINOIS	CONRAIL
CHICAGO, 63RD ST.	ILLINOIS	CONRAIL
CHICAGO, GLOBAL ONE	ILLINOIS	CANADIAN NATIONAL
CICERO	ILLINOIS	BURLINGTON NORTHERN
CORWITH (CHICAGO)	ILLINOIS	ATCHISON, TOPEKA & SANTA FE
BATTLE CREEK	MICHIGAN	GRAND TRUNK WESTERN
DETROIT	MICHIGAN	CANADIAN PACIFIC, SOO LINES
DETROIT	MICHIGAN	CONRAIL
DETROIT	MICHIGAN	NORFOLK SOUTHERN
DETROIT (N. YARD)	MICHIGAN	CONRAIL
FERNDALE (DETROIT)	MICHIGAN	GRAND TRUNK WESTERN
MOUNT CLEMENS	MICHIGAN	GRAND TRUNK WESTERN
NEW BOSTON	MICHIGAN	CSX TRANSPORTATION

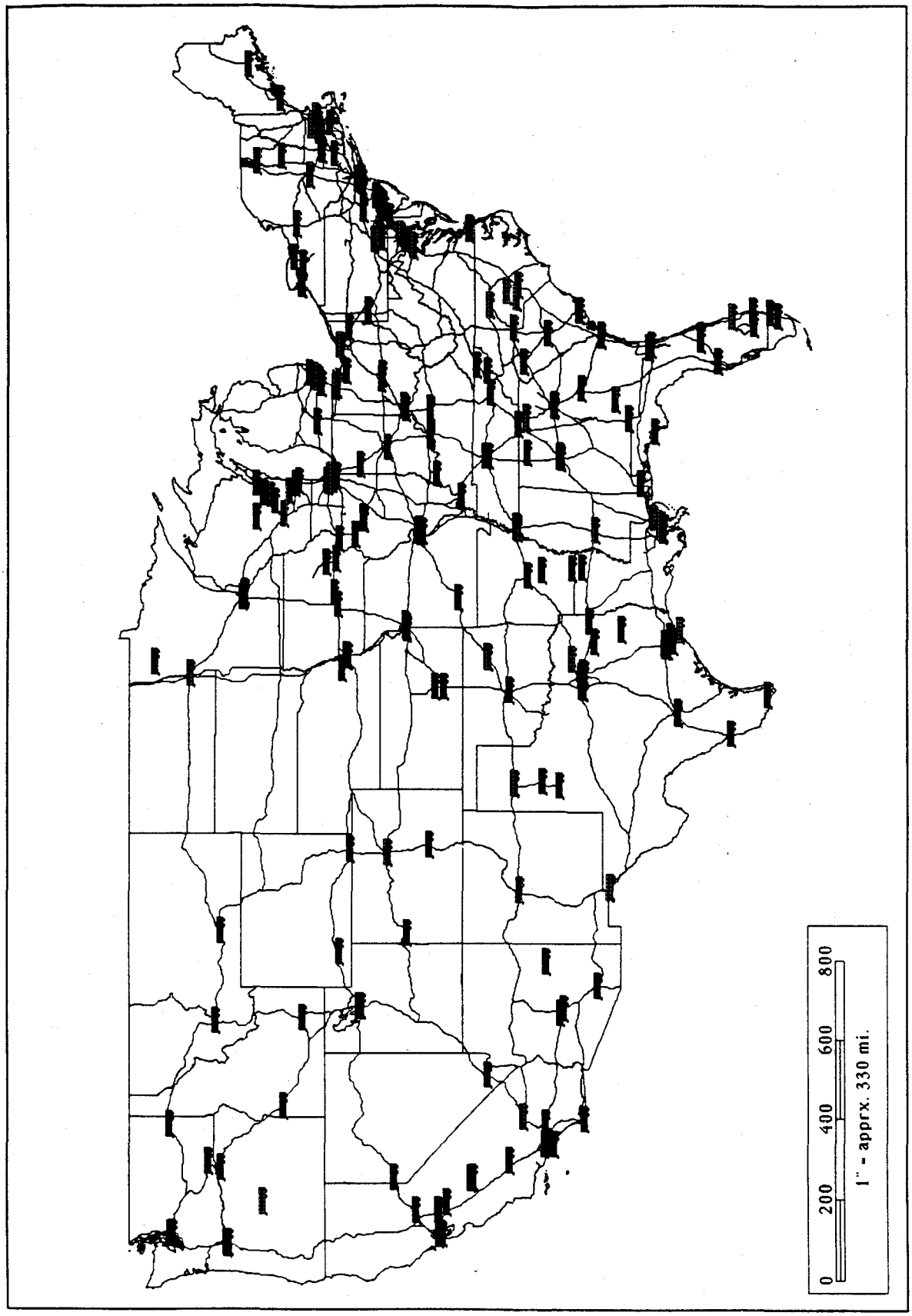

FIGURE 1-2. NORTHEAST U.S. INTERMODAL TRANSFER FACILITIES (TRUCK - RAIL)

1.9.1 Federal Inspectional Services

Numerous studies of border crossing issues on the U.S.-Canada and U.S.-Mexico borders have identified staffing levels and booth management, especially at primary inspection points, as a principal factor of delays and congestion. There is a growing concern on the U.S.-Canada border about the level of staffing available for individual crossings. While both Customs and the Immigration and Naturalization Service (INS) are already short of budget, there are new reductions planned for both Services. There has been some indication that Customs will be reducing its overall headcount by about 1000 positions over the next two fiscal years. Because of reports about increases in staff for the Mexican border and reports of requests for northern border staff to transfer to the Mexican border, there is a growing awareness about potential cutbacks in staff for the U.S.-Canada border. These staff reductions could seriously impede northern border operations unless procedures are changed radically.

Table 1-11 identifies staffing levels for the area ports of entry by frontier region. For study comparison purposes, the Canadian staffing levels in this table correspond to U.S. area ports, rather than to Canadian area ports.

The critical staffing concern that directly impacts the flow of traffic is with regards to the number of primary inspection booths that can operate at any given time. Many backups at the border crossings occur when too few of the available primary inspection booths are open. Many crossing operators have reported that both Customs and Immigration personnel on both sides of the border are slow to open booths when traffic spikes occur. Just few minutes delay in opening additional booths can lead to long backups that take hours to alleviate, even after additional booths are brought on line. It is generally believed that improvements in border efficiency will require more careful forecasting of booth staffing requirements, and faster reaction to unanticipated spikes in traffic. Movement of personnel for special assignments and rotations often presents complications with having adequate staff at each location.

1.9.2 Coordination Among Federal Agencies

In the U.S., Customs and INS operate as separate organizations with each reporting to its own federal department. Customs is a part of the Treasury Department, and INS is part of the Justice Department. While agents are cross-designated annually to perform the functions of the other agency at primary inspection points, numerous studies have pointed out a lack of cooperation and coordination between these two agencies. Positive working relationships are also critical between these agencies and the General Services Administration, Border Patrol, and the United States Department of Agriculture (USDA). The GSA is especially important at many locations where it is the owner of the facility.

One of the principal problems relates to the fact that both agencies staff primary inspection booths, usually on an alternating basis with one agency opening the first booth and the other opening the second and then alternating. Because INS has fewer people available at most

TABLE 1-11. INSPECTION SERVICE STAFFING

LOCATION	U.S. CUSTOMS[1]	U.S. INS[2] Perm/Temp	CANADA[3]
MICHIGAN FRONTIER			
Ambassador Bridge	NA	NA	133
Detroit-Windsor Tunnel	NA	NA	83
Port of Detroit	238	53	216
Port of Port Huron	46	16	69
Port of Sault St. Marie	14	9	37
BUFFALO/NIAGARA FRONTIER			
Peace Bridge	NA	24	72
Rainbow Bridge	NA	NA	41
Whirlpool Rapids Bridge	NA	NA	25
Lewiston - Queenston Bridge	NA	NA	46
NFBC Bridge Niagara	NA	38	112
Port of Buffalo/Niagara	238	62	184
EASTERN NEW YORK FRONTIER			
Port of Thousand Islands	25	9	32
Port of Ogdensburg	54	7	17
Port of Massenea	13	7	16
MAINE FRONTIER			
Port of Calais	25	23	51
Port of Houlton	30	21	55
Port of Madawaska	24	22	40
Port of Jackman	14	9	16
MONTREAL SOUTH FRONTIER			
Port of Norton	6	5	18
Port of Derby Line	24	16	44
Port of Richford	13	12	19
Port of Highgate Springs	32	14	39
Port of Champlain[4]	70	24/19	58

[1]Authorized Inspectors 1992; the 4 ports in Maine include Area Port Directors; the 5 ports in Montreal South include 4 inspectors dedicated to special operations
[2]Authorized Permanent Inspectors PMEA 1993
[3]Combined Immigration/Customs Inspectors 1992, includes Managers/Supervisors
[4]Includes collateral duties such as bonded warehouses in St. Albans, Vermont

crossings, Customs is obliged to provide additional staff, especially at primary and secondary inspection points.

Over the years a number of proposals have been made to combine these two key agencies at the primary inspection level, much as Canada has done. Most recently, the General Accounting Office has issued a report on this topic requested by then Senator Bentsen of Texas. The report is entitled, "Customs Service and INS: Dual Management Structure for Border Inspections Should be Ended," and is dated June 30, 1993. The report recommends placing primary inspection responsibilities with one agency, or actually combining the two agencies altogether, and indicates that a panel of experts favored the latter approach.

1.9.3 Lack of Consistent Policies by Inspection Agencies

During the study a number of policy inconsistencies by region were discovered. First, there is a wide variation in who is required to pay for new border facilities required by Customs and INS. In some cases the local operator has paid for new facilities, such as at the Blue Water Bridge where the State of Michigan owns the facility on the U.S. side. At the Ambassador Bridge on the other hand, GSA paid for the new truck complex.

A second inconsistency relates to the acceptance of off-site truck primary and secondary inspection facilities. Costs for on-plaza facilities are often much higher because of a lack of space, while off-site facilities are far less expensive. However, Customs and INS often demand that facilities be on-site regardless of the cost. At the Blue Water Bridge, the plaza cost $50 million in part because because Customs preferred an on-site truck facility which had to be built above city streets. Customs requirements for a secure and dedicated roadway to a proposed off-site truck facility at the Peace Bridge were partly responsible for abandoning the off-site concept. However, at the Detroit-Windsor auto and truck tunnel, the truck secondary inspection facility has been off-site, a mile or so down unsecured city streets, for a number of years. It also should be noted that Canadian Customs has off-site secondary truck facilities at both the Detroit Tunnel and at the Ambassador Bridge.

A third area of inconsistencies relates to inspection procedures. At many crossings in Maine there are no inspection facilities at all and travellers are instructed to check in at a facility elsewhere. At other crossings commercial services are not available at night. Yet every vehicle crossing the border in a major city is carefully analyzed. The ability to detain illegal border entrants is also minimal. At most crossings violators that are caught by the Border Patrol are given cards instructing them to report for hearings within 30 days and set free. Policies on the degree of inspections also seem to vary widely by Customs District. Overall, these issues raise questions about what the appropriate Customs and INS policies ought to be on the Canadian border, and what the appropriate levels of enforcement might be.

1.9.4 Institutional Issues

While there are significant infrastructure barriers to efficient cross-border intermodal movements, many of the problems are institutional or organizational. On the freight side, union contracts dictate separate rail crews for each side of the border and this leads to the

need for border yards. At the same time, separate railroad operating organizations in Canada and in the U.S. are just recently becoming more integrated in terms of cross-border marketing and operations.

Immigration and Customs laws and regulations also impose a number of barriers to intermodal efficiency on freight movements. Immigration laws prevent rail crews from operating equipment in the domestic commerce of a country if they are not a resident of that country. Customs laws and regulations require payment of duties and or entry processing fees on any equipment which might be used in domestic commerce. This requirement results in railroads segregating operating stock for use in cross-border or domestic commerce only and thus decreases utilization rates.

Customs inspection requirements can also lead to problems. There have been instances where cranes have had to be rented and brought to the site, in order to lift off upper containers and remove a lower container for inspection. Uniform procedures for inspection of such containers at destination terminals, a measure currently being pursued, would be helpful. Routine processing of container trains can result in unnecessary delays. Intermodal shipments are increasingly time sensitive, requiring expedited processing. Increased use of preclearance shipments should be an objective to ensure certainty of intermodal connections. Lack of sufficient staffing at highway crossings increases the difficulty in diverting staff to rail inspections, causing delays.

Regarding passenger intermodal transportation, the needs are also institutionally oriented. Efficiencies in border inspectional procedures must accompany advances in travel, such as high speed rail. Until the 1960s, federal inspection staff routinely rode the trains and conducted their business en route. Not enough lines use this practice today. Another option is to implement preclearance procedures at terminals, much as is the case with U.S.-Canada airline travel.

There is also an opportunity to better use airports on both sides of the border in metropolitan areas. At Detroit and Windsor, both airports offer flights to major Canadian cities; however, one airport or the other may have a better schedule on a given day, or a transfer between airports may be necessary. However, current bus and taxi services are not sufficient to promote better utilization of flights from each airport. In addition, uncertainty about inspections at the land border can present additional problems.

1.9.5 Other Institutional Issues

Other institutional issues relate to the practices of crossing operators, brokers and carrier/shippers. Most locations with bridge and tunnel operators have efficient organizational structures, but there are some complicated arrangements. For instance, originally the Blue Water Bridge at Port Huron, Michigan, was entirely managed by one agency on both sides, but since 1962 each side has been managed by its own owner. Fortunately, this is working well at present, but it is not the ideal arrangement and may contribute to less efficient practices. For instance it may make toll collection in each direction more likely. Such arrangements can also complicate the construction of new

roadbed capacity.

Border crossing operations are also affected by such factors as inefficient toll collection systems and extraneous tax collection duties. An example of the later is along the Maine/New Brunswick border where Canada customs agents have begun collecting the 11 percent provincial tax. Modern toll collection systems combined with automated vehicle intelligent systems can contribute significantly to reducing congestion.

Construction projects also create delays, especially when they are conducted during periods of moderate to heavy traffic flows. Proper signage indicating detours and directions to approaching and departing vehicles during times of construction is also important.

Shippers and carriers can also be the source of major delays at the border when they do not follow proper procedures and/or are not apprised of regulations. A truck arriving with several LTL loads will be held up indefinitely if just one consignment has a problem and may have to stop and unload the shipment before it can proceed across the border with other consignments that are in compliance with rules and regulations. This can be an especially severe problem when double stack container trains are involved.

Customs brokers play a major role in determining the efficiency of a crossing. Canadian brokers are not under enough competition to compelled them to offer full nighttime services, and this contributes significantly to early morning commercial vehicle backups entering the U.S. Customs officials and brokers alike need to be on-line to their counterparts in the neighboring country and be full participants in automation efforts. The Customs Modernization Act is critical to achieving efficiencies that can be realized through automation applications.

2. PLANNED IMPROVEMENTS

This chapter discusses particular improvements in the Northeast that will increase the efficiency, effectiveness and/or capacity of the border facilities in this region to accommodate current and future transportation. Projects identified, both proposed and underway, include crossing facilities, plazas, highway connections and corridors. The decline in automobile traffic since 1992 may have an impact on the proposed improvements plans identified in this chapter.

2.1 HIGHWAY MODE

2.1.1 Michigan Frontier

The most immediate need for the highway mode appears to be at Port Huron, Michigan. The State of Michigan and the Canadian Blue Water Bridge Authority have agreed to proceed with a second span to augment the existing two-lane bridge that was built in 1938. This project will be the first new international highway bridge on the U.S.-Canada border in 30 years. The cost of the project, originally estimated at $65 million, now at $75 million, is to be funded with revenue bonds reimbursed by tolls. There has also been some consideration of engaging in either a build-transfer-operate (BTO) or build-operate-transfer (BOT) approach with a private organization. Planning for this project was formalized in a 1982 Michigan-Ontario study in which both parties agreed that when the bi-directional Design Hour Volume (DHV) reached 1500 vehicles per hour (vph), detailed planning for a new span should begin. During 1992, design hour traffic levels exceeded the estimated design hour bi-directional capacity of 1700 to 1800 vehicles. Final plans are now being made to redeck the existing bridge and construct the new second span adjacent to the existing bridge.

At the Detroit-Windsor Highway Tunnel, the Detroit and Canada Tunnel Corporation (DCTC) is in the first of a multiple phase plan for a major $25 million capital improvement project to the Canadian plaza and tunnel structure. The first phase is a $15 million one year project to revamp the Canadian plaza and increase the number of toll and customs booths, and resurface and retile the tunnel. A total of six toll booths will be available, rather than the current four, and ten customs booths, instead of the current four. Advanced toll technology will allow frequent users to pay tolls by mail on a monthly basis, and motion sensors and video cameras will allow quicker Customs response to backups. Passenger vehicle secondary inspection will be increased to a 40 vehicle capacity. The City of Windsor, Ontario, is also working on improvements to the city streets and intersections around the tunnel. Long-term improvement needs will require an estimated funding of $20 million.

On the U.S. side of the Ambassador Bridge, improvements include a recent truck exit ramp and a new separately located truck inspection plaza with six primary inspection lanes and an expanded truck secondary parking lot. These improvements have made space available on the bridge plaza which can be used for additional auto primary inspection booths. Construction plans anticipate having a total of 20 automobile primary inspection booths. The plaza also includes new customs administration/broker building.

On the Canadian side of the Ambassador Bridge, recent improvements include moving the secondary truck facility off-site, and providing an area for automobile secondary inspection with capacity to accommodate 60 passenger vehicles. An administration building for customs is under construction. The plaza is also being expanded to provide eight additional primary inspection booths, increasing the number of booths to 20. The capacity increase to be realized is about 800 passenger vehicles per hour for each facility. Ten of the twenty booths will be capable of accommodating commercial, as well as passenger vehicles.

On the Canadian side of the Detroit-Windsor auto tunnel, an additional two booths are planned, which is expected to increase capacity by 200 vehicles per hour.

2.1.2 Niagara Frontier

The Peace Bridge is the top priority on GSA's "top ten" list for facility improvements. This list is submitted annually by Customs and INS to the GSA Central Office. In March 1993, a study prepared by Parsons Brinckerhoff Quade and Douglas, Inc., predicted that by 1996 capacity of the existing three lanes would be exceeded during peak travel days and times. Anticipated improvements to increase the capacity at this crossing include three new lanes by the year 2000. The three lanes are to be added to the existing piers using a cantilevered approach, which has an estimated cost of $65 to $100 million. Capacity increase to be realized from each additional lane is approximately 1000 passenger vehicles per hour.

Construction plans at the Peace Bridge also call for increasing the current 12 automobile primary booths to 20 by the year 2000. Approximately, 800 additional passenger vehicles per hour will be accommodated with this enhancement. The NFBC has also tentatively decided to abandon efforts to obtain an off-site truck secondary facility on the U.S. side. The new plan envisions a pre-arrival truck secondary inspection yard on the Canadian side, where space is available. Trucks would arrange clearance electronically from this facility and then proceed to the U.S. where most would pass through with minimum delays. Only commercial vehicles with line release consignments would enter this facility. U.S. Customs officials would not be located in Canada.

Another bridge requirement is at the Whirlpool Rapids Bridge at Niagara Falls. This two deck bridge was built about 100 years ago and currently carries rail traffic on the upper deck and two lanes of highway traffic on the lower deck. Extreme congestion problems have prompted NFBC plans to include an option for widening of the upper deck for joint highway/rail use and use of the lower deck for light highway traffic. The recommendation is to replace the upper railroad deck and rehabilitate the remainder of the structure to accommodate a 2-way, 2-lane passenger vehicles and limited size trucks. The total costs of

this option are estimated at $35 million. In addition, recommendations include additional plaza space, primary inspection facilities, and improvements to the roadbed. Further details of this plan can be found in Appendix 4, on the Niagara Frontier. The Canadian facility is very small and inadequate.

Other major plaza needs exist at the Rainbow, Whirlpool Rapids and Lewiston-Queenston bridges. Specifically, primary inspection capacity is restrictive, and plans are underway to substantially increase the capacity at these three inspection points. The Rainbow Bridge will require a complete reconfiguration to provide additional booths needed to process existing and future traffic. At the Lewiston-Queenston Bridge, the need is for truck primary booths and secondary processing capability.

As part of a Master Plan for the three bridges under their control, the NFBC has developed plans for a larger, modern border station on the U.S. side of the Rainbow Bridge. The Real Estate Division of Region 2 has also had several meetings with U.S. Customs and INS to present their particular requirements. The NFBC has spent considerable resources to develop the plot plans with the agencies. GSA continues to work with the NFBC.

2.1.3 East New York Frontier

In terms of highway connections, there has been interest in upgrading Highway 37 to four lanes for a long time. This corridor runs adjacent to the northern border of New York State, connecting to the Seaway International Bridge in Massena, New York with Cornwall, Ontario. On the Canada side of this crossing, there has been strong interest in a much delayed project to upgrade Highway 16, between Ottawa and Prescott, to four lane.

At the Seaway International Bridge, physical concerns revolve around the imposition of 70,000 pound weight restrictions and the ramifications of those restrictions on local industry. These issues were addressed in a Seaway International Bridge Report, prepared by the Sear-Brown Group, Inc., but further studies have alleviated some of these concerns. The roadbed capacity and current deck condition should allow for operation for a number of years, however, the St. Lawrence Seaway Corporation has yet to develop a long range plan to ensure adequate service to northern New York. Problems with the physical condition of the bridge are compounded by the bridge's location on land purchased from the Akwesasne Indian Reservation by expropriation. The St. Lawrence Board of Legislators passed a Resolution (244-91) indicating their concerns relative to this bridge crossing, the possible need for a new bridge, and the desire for federal assistance. They have been working closely with the New York Department of Transportation and the Office of Rural Affairs to resolve the problems at the Seaway International Bridge, and are in the process of submitting another Resolution, due to recent and continued disturbances at this location. Concern about potential future blockades of the bridge, weight restrictions, and interest in building a new structure off the reservation have been formally discussed and well documented since October 1990. Current capacity plans at the Seaway International Bridge include expansion of the toll plaza. There is also an issue with securing rights to proceed with this plan.

At the Thousand Islands Bridge, major redecking and repairs are being performed on the north approach of the Canadian Bridge. A computerized toll collection system at both toll plazas was completed in July 1993. Special features such as commercial charge cards are expected to become functional in 1994. Vehicle throughput for all vehicles will be enhanced at the toll plazas with these functions.

Also underway at Thousand Islands is a changeable message/patron information signage project for all spans and approaches, to be complete by fall 1994. This system will enhance safety and will provide information such as road conditions, delays due to construction, commercial vehicle weight restrictions, and spacing requirements for vehicles while crossing the bridge.

Planned enhancements to the Ogdensburg Bridge crossing involve three new toll booths.

2.1.4 Montreal South Frontier

The port of Highgate Springs has recently been removed from GSA's "top ten" priority list for border stations in need of physical improvements. Design plans for a new border facility project, estimated at $6.4 million, are expected to be completed by December 1993. The cost of design and land acquisition is currently estimated at $800,000. The new station, expected for completion between 1996 and 1997, will be constructed adjacent to the existing site. The new site will consist of approximately 8 acres, including the acreage from the existing site. It will allow a more direct truck route from the truck inspection area back to U.S. Interstate 89 southbound.

One additional auto primary lane, three additional non-covered secondary inspection lanes, and five secondary inspection garage bays will be added to the facility. The four truck bays that exist today are not large enough to accommodate full size commercial vehicles. Contingent upon land acquisition negotiations, the station will provide truck parking and a hazardous materials area to be located on the outskirts of the existing site. A truck scale will be installed for the new truck inspection lane. Across the border in Quebec, the Port of St. Armand-Philipsburg is a newly constructed spacious facility with modern technological capabilities.

The predominant concern in the Montreal South Frontier is the deficient Highway 133 in Quebec at St. Armand-Philipsburg. Because this highway connects to U.S. Interstate 89, which is part of the National Highway System (NHS), there is some need for the Canadian Government to upgrade this highway. Several years ago, highway upgrading was completed for just a few miles after connecting to Route 133 from the border. The project was hampered due to lack of funding. Currently, a highway transportation committee based in St. Albans, Vermont, is actively seeking funding options to upgrade this corridor which is important to the economy of Vermont.

Proposed improvements at the Derby Line I-91 port of entry include enhancements to the warehouse to accommodate border cargo selectivity. Planning studies have been initiated to replace the facility on Route 143 in Quebec. Subject to funding availability, construction for

this project is proposed to begin sometime between 1994 and 1995. However, in the U.S. there is some desire to close the Route 5 facility that corresponds to the Canadian facility, considering its close proximity to the Derby Line I-91 crossing only 4/10 mile away. Additionally, the congestion problems that are experienced on holidays and long weekends due to the location of the Derby Line Route 5 crossing on Main Street already require State Police assistance in rerouting traffic to the I-91 crossing.

At Champlain, needed improvements include a partition in the secondary inspection area to provide some shelter for inspectors, and lighting. Both lighting and climate control capabilities are needed at this facility. Funding has been appropriated for the lighting and the partition, though improvements are still pending. Additionally, another truck lane at Champlain has been discussed, as well as other suggested enhancements at this location and at Rouses Point, such as license plate readers.

The border facility at the small commercial crossing at the Chateaugay port of entry has a dilapidated administration building. Suggestions favor razing it and reconstructing a new facility.

2.1.5 Maine Frontier

The most urgent physical infrastructure inefficiency in the Maine frontier is at the Ferry Point port of entry in Calais, Maine. In August 1992, the Maine and New Brunswick Departments of Transportation submitted a detailed proposal to construct a new bridge, including new highways in the Calais/St. Stephen area to relieve the severe congestion problem at this site. The New Brunswick community is eager to proceed with the new bridge, but the town of Calais is reluctant. The Maine legislature recently created a "new sensible transportation policy act" which spurred the process to stop legislation required for construction of an international bridge. As a result, the state of Maine has agreed to explore other options to try to either accommodate the traffic better or reduce the flow of traffic through this crossing. The State is not optimistic about the prospects of a new bridge in the near future.

In the absence of a solution to the congestion problem experienced at the Ferry Point crossing, GSA recently removed it from the "top ten" physical improvements priority list. As an interim, partial measure, GSA has plans to erect a temporary truck inspection facility that will accommodate two full size commercial vehicles.

The Madawaska border station continues to be ranked high in the "top ten" list. The chief concern continues to be the congestion caused by the limited size of the existing inspection facilities. As with the Calais/St. Stephen crossing, both the U.S. and Canadian stations are located in the heart of the respective business districts and within 100 feet of the banks of the river.

The General Services Administration is currently involved in negotiations with the Bangor-Aroostook Railroad Company to purchase an additional parcel of land adjacent to the present Madawaska facility so that it can be expanded to accommodate current traffic levels and to

provide a truck inspection warehouse on-site. The feasibility of this project is dependent upon successful land acquisition negotiations with the Bangor-Aroostook Railroad Company.

In the U.S., at the Jackman port of entry, new pavement is being added to increase maneuverability. A new truck inspection booth will be added near the loading dock. In Armstrong, Quebec, preliminary planning studies have been initiated to expand the Canadian facility. Subject to funding availability, construction will begin between 1994 and 1995.

Improvement plans for the smaller stations under the port of Jackman are also underway. At Coburn Gore, there have been discussions to reconstruct this facility as a joint use station. At St. Pamphile, GSA has acquired land for a new station. It is anticipated that the replacement of this facility will be completed by November 1993. The estimated cost for this facility, a single person operation, is $250,000.

At the Houlton station, the first and second primary lanes need repaving almost every year, and the truck lane, every other year. The facility has requested FY94 funds for new pavement. Additionally, cashier windows have been proposed for the primary inspection booths so that 100 percent heat loss is avoided when conducting inspections. Due, in part, to severe weather conditions, pavement is a constant expenditure for many of the stations in the Maine Frontier. The Vanceboro crossing just received $200,000 for repavement.

In terms of highway corridor upgrades, in April 1993, the Governments of Canada and New Brunswick announced a $300 million funding initiative to improve the New Brunswick component of the Trans Canada Highway or the "Atlantic Expressway." Work began this summer to upgrade the Houlton/Woodstock port including the bypass and interchange with U.S. Interstate 95. Thirty-nine million dollars has been earmarked for this component of the construction.

2.2 RAILROAD MODE

The owner of the 100 year old Canadian National Rail tunnel at Port Huron has secured permission, through a Presidential Permit required under the International Bridge Act of 1972, to build a new $155 million rail tunnel. The new tunnel will have the capacity to accommodate full double stack service, tri-levels, and high cube box cars. Completion of the new rail tunnel will allow for elimination of two rail ferries at Port Huron that are operated by Canadian National and CSX railroads.

To the south about 50 miles, Windsor, Ontario, and Detroit, Michigan, believe they need a double stack capacity tunnel in order to compete with Port Huron. The current tunnel, owned by Canadian National and Canadian Pacific, is scheduled to be partially deepened by Canadian Pacific at a cost of US$30 million. This partial deepening will not allow full double stacks but will allow tri-levels, high cubes and TOFC cars. The project has been slowed by the City of Detroit's delays in issuing building permits. The City would prefer that the tunnel be deepened to a full double stack capability. Some technical disagreement exists regarding the feasibility and cost of this proposal. Canadian Pacific agrees with the need for double stack service but cannot justify paying the full cost alone and has been

interested in the possibility of government assistance.

The additional traffic anticipated from these tunnel improvements points to the need for additional intermodal space in the Detroit area where both Canadian National and Canadian Pacific railroads maintain intermodal terminals. The anticipated traffic growth is leading to concerns about the need for grade separations on the mainlines between Detroit/Port Huron and Chicago. Any high speed rail link between Chicago and Toronto via Detroit would also require monies for rail/highway grade separations.

In the Maine frontier, the Canadian Pacific Railroad has filed for abandonment for its Canadian Atlantic Railroad line that runs in an east/west direction through the State of Maine. This is part of a larger Canadian Pacific plan to eventually withdraw its operations in the maritime provinces where operating losses of $50,000 have accumulated daily for the past three years. The National Transportation Agency in Canada has concluded its hearings on the matter, and has granted its approval for abandonment. A public hearing is being held by the ICC in October 1993.

Canadian Pacific anticipates that future rationalization of rail lines throughout its rail system will be necessary in order to remain viable.

3. EXISTING TRADE CORRIDORS

3.1 INTRODUCTION

This chapter is a review of the current trading patterns between the U.S. and Canada. The focus is on the trade going by highway or rail because these modes represent the major portion of the flows between the two countries. However, the air and waterborne trades are also discussed. This report covers the northeastern portion of the U.S. and the eastern portion of Canada. The land crossings covered correspond to those discussed in Chapters 1 and 2, i.e., from Sault Ste. Marie, Michigan, to Calais, Maine. Waterborne traffic from East Coast ports and the Great Lakes/St. Lawrence Seaway is summarized as well as Eastern U.S.-Canada air activity.

Section 6015 of the ISTEA requires an identification of existing trade corridors and an assessment of the adequacy of the infrastructure, in particular the border infrastructure, to accommodate the current and future trade levels. As a result the focus of this analysis is upon land modes.

The primary information source for this analysis is the foreign trade data of the U.S. Bureau of the Census. Under a data exchange program between Canada and the U.S., the import statistics of one nation, which typically have greater reliability than export data, are exchanged to form the other country's export data.[1] Thus, the Census data set is developed from U.S. Customs Service data on imports into the U.S. Export data are developed from Revenue Canada data on U.S. imports into Canada.

The study period for this analysis has been determined by two factors. The first is the enactment of the U.S.-Canada Free Trade Agreement (FTA), which began in January, 1989. This agreement led to reductions of tariffs between the two countries and shifts in the terms of trade that had been in place. As a result, the trading relationships pre and post FTA should be substantially different.[2] The second determining factor is the quality of data. Trade data and statistics are being improved constantly; however, the changes between 1988 and 1989 were apparently so substantial that Census officials recommended that pre 1989 data not be used for the detailed level of analysis needed in this study. An examination of the data indicated consistency from 1990 and 1992. However as will be noted below, 1989 data still have some problems supporting the level of analysis of this study.

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[1]For this analysis the U.S. Bureau of the Census made a special run of the detailed foreign trade data. Those fields of little use to the study and data that might disclose proprietary information were deleted. Otherwise the detailed records were made available to the study team.

[2]This is a issue that should be addressed econometrically. Unfortunately, such an effort is beyond the scope of this study. It should be noted that not all tariff and trading relationships were altered in 1988. The U.S. and Canadian auto industries had essentially been granted free trade status earlier.

A general overview of U.S.-Canada trade is presented before the analysis of the eastern border flows. This is followed by a presentation of eastern land trade. Finally, a description of water and air modes is presented.

3.2 AGGREGATE TRADE FLOW PATTERNS

Total exports to Canada grew over the study period at a fairly consistent rate. From 1989 to 1992, total exports increased 15.2 percent, from $18.3 billion to $90.2 billion. (Dollars reported are current U.S. dollars.) The growth favored the land[3] and air modes. In 1989, land modes accounted for 89.7 percent of the trade in value terms, while water accounted for 4.4 percent and air, 5.9 percent. By 1992, land modes had captured a larger percentage of a larger pie, growing from the 89.7 to 91.2 percent. Air grew even more rapidly to reach a market share of 7.1 percent. The water modes not only were unable to maintain market share, but lost trade in absolute terms, down to 1.7 percent of total exports as can been seen in Table 3-1.

Total imports from Canada show a different trend. Over the period from 1989 to 1992, total imports increased 11.7 percent, but most of this occurred in the last year. All three broad modal classes grew in the absolute dollar value of trade, but in this case, both the air and water modes gained market share and the land modes grew less rapidly, thereby losing market share from 92.5 to 84.8 percent. The land modes remained the dominant modes throughout the period. This information is presented in Table 3-2.

For each year in the study period, there was an imbalance in trade, with exports falling short of imports.

Just as the trade between the U.S. and Canada is concentrated in the land modes, it is concentrated geographically. For 1992, Michigan accounts for 15.7 percent of exports, and the top 7 states, identified in the database as the originating state of the exports, are responsible for 51.5 percent of all exports to Canada. The distribution of exporting states is shown in Table 3-3. The location of the major exporting states can more readily be seen in Figure 3-1. Those states most active in trading with Canada are located in the North Central and Mid-Atlantic regions. The major exceptions are California (the third largest exporting state) and Texas (seventh largest).

Importing patterns are even more concentrated among a few states. The distribution of exports for 1992 by state is shown in Table 3-4. Michigan is the major trading state in terms of imports as well, accounting for 23.8 percent of all imports. Five states account for more than 50 percent of the trade and the top seven states are responsible for 58.3 percent of

[3]The Bureau of the Census classifies the modes of exports as "air', 'water', and 'other'. For this report 'other' is referred to as the 'land', including highway, rail and other modes. There is no separate breakout for these modes for exports. Imports do have greater detail. However, the results of this separate reporting are not always realistic.

TABLE 3-1. Total US Exports to Canada by Mode

YEAR	Air	Water	Land	Total
1989	$4,615,748,487	$3,482,357,150	$70,168,055,876	$78,266,161,513
1990	$6,036,123,371	$1,937,987,690	$74,992,429,586	$82,966,540,647
1991	$5,861,455,955	$1,490,262,299	$77,794,578,788	$85,146,297,042
1992	$6,394,212,123	$1,545,202,835	$82,215,094,135	$90,154,509,093

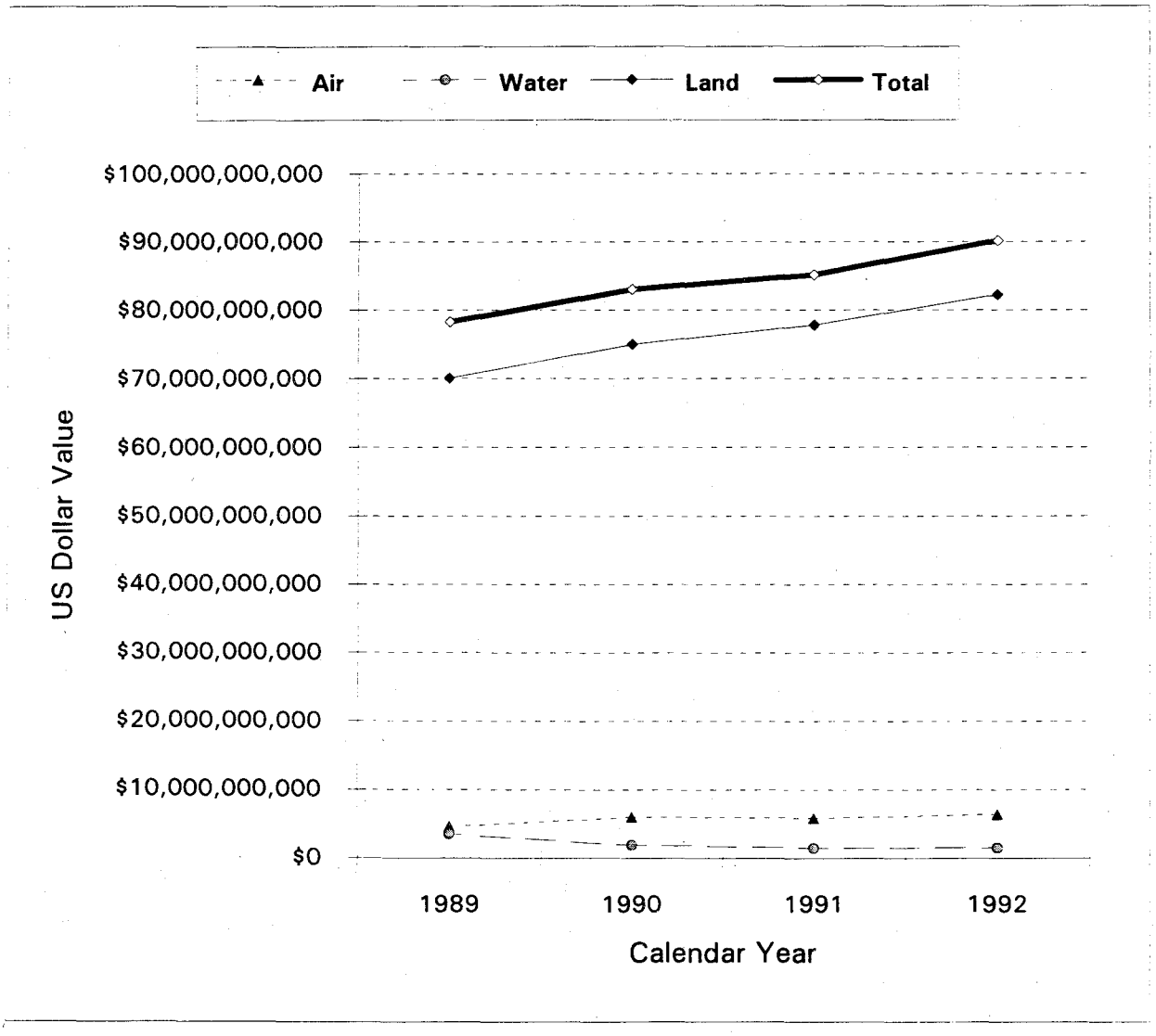


TABLE 3-2. Total US Imports from Canada by Mode

YEAR	Air	Water	Highway	Rail	Other	Totals
1989	$1,353,158,144	$5,309,356,405	$23,648,448,201	$55,175,738,304	$2,723,280,729	$88,209,981,783
1990	$3,315,353,565	$9,674,929,014	$53,257,231,567	$16,913,707,733	$8,210,802,352	$91,372,024,231
1991	$4,142,178,379	$10,406,109,486	$51,891,086,568	$15,710,341,219	$8,914,397,380	$91,064,113,032
1992	$4,543,617,486	$10,413,833,020	$56,672;885,763	$17,309,885,773	$9,556,963,601	$98,497,185,643

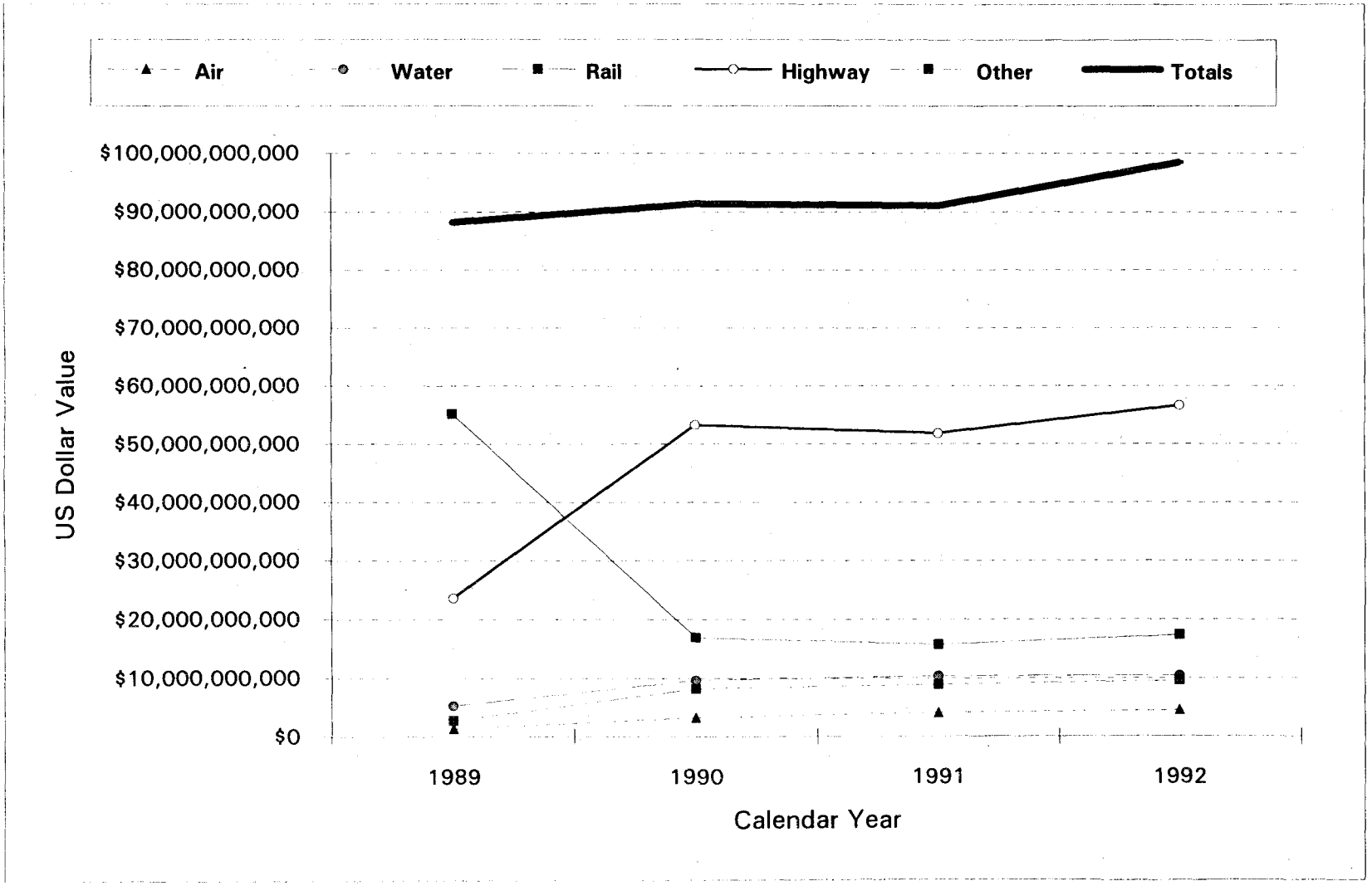


TABLE 3-3. 1992 U.S. EXPORTS TO CANADA BY STATE

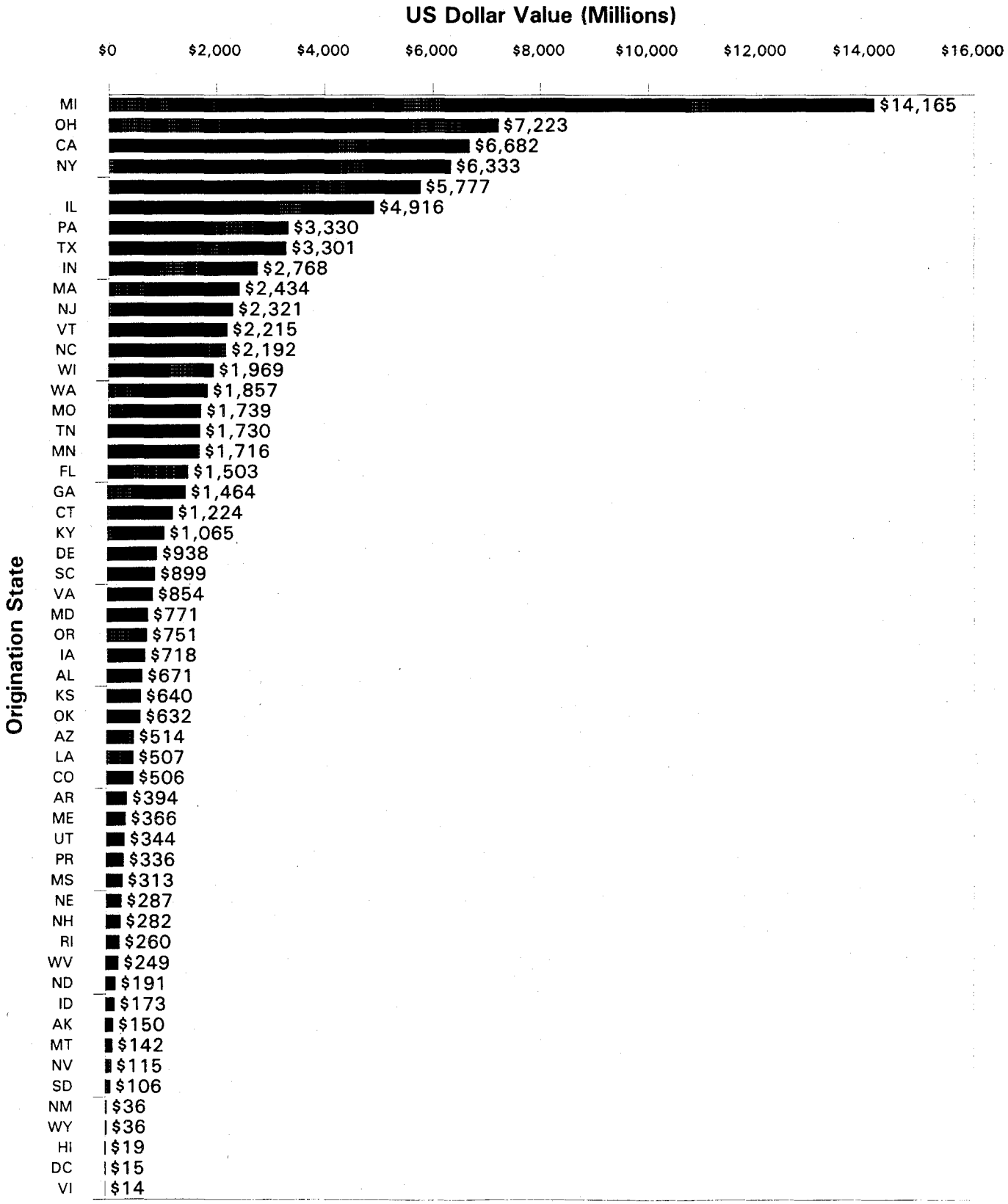


Figure 3-1. 1992 US Exports to Canada by State (in dollars)

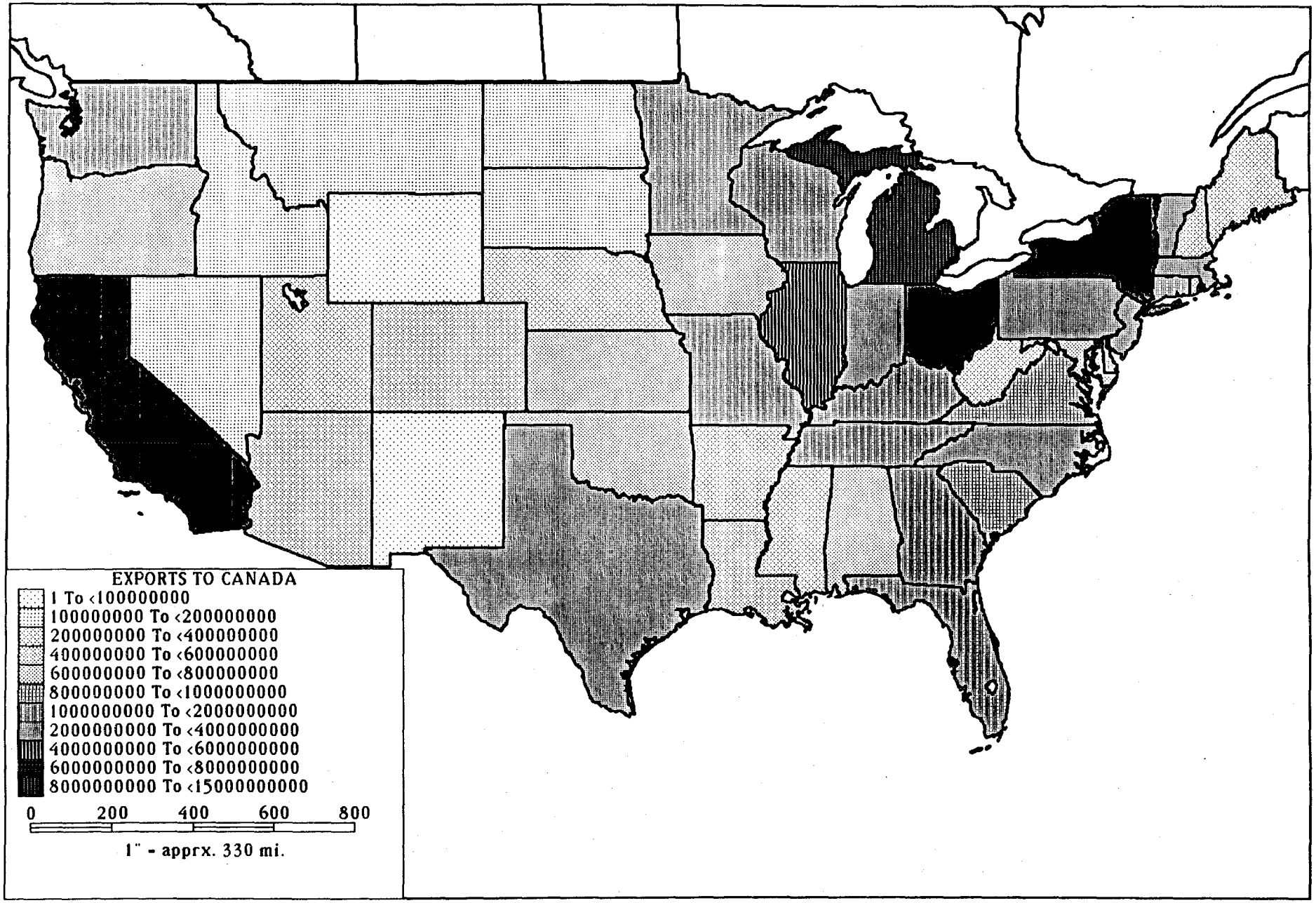
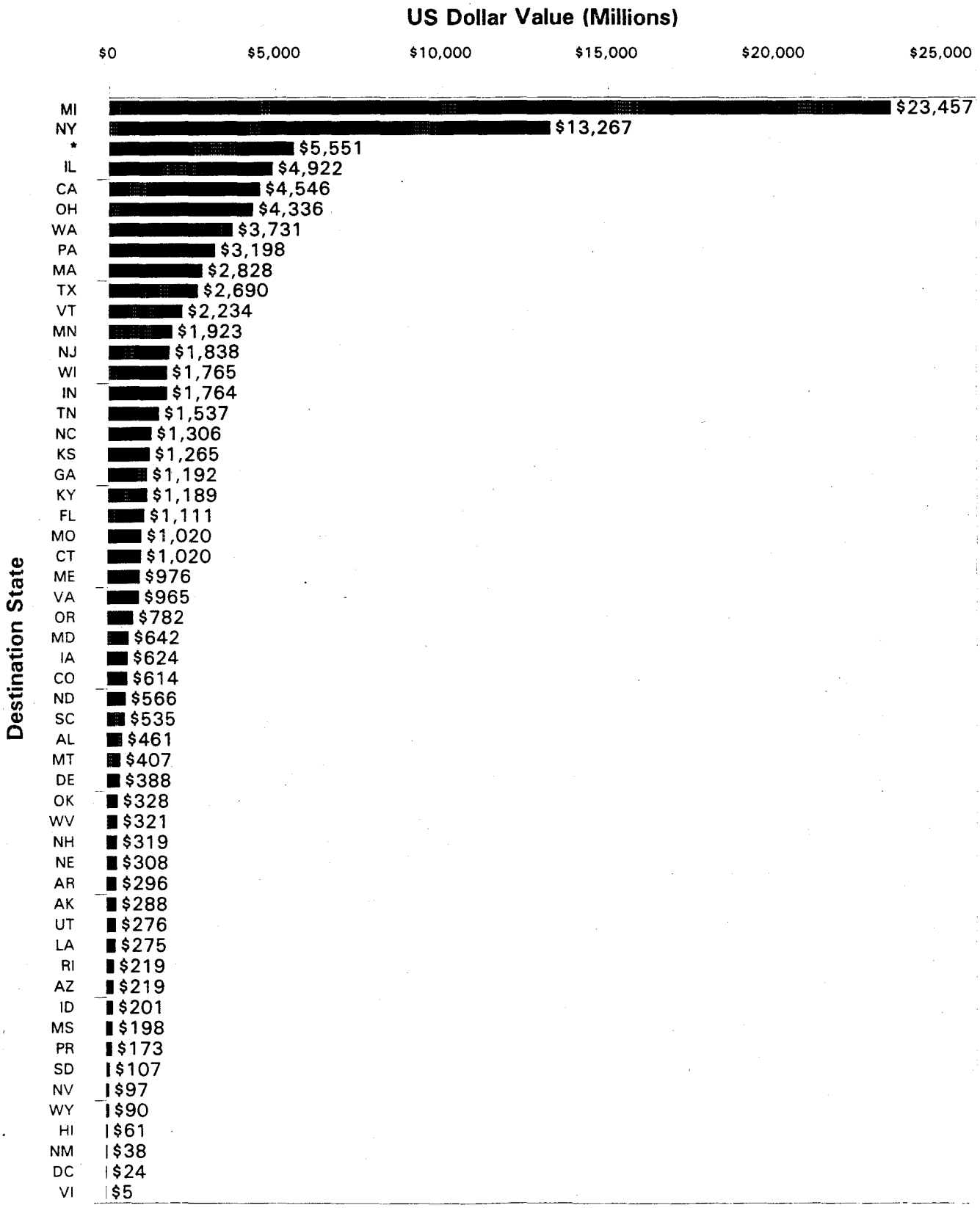


TABLE 3-4. 1992 U.S. IMPORTS FROM CANADA BY STATE



*Not classified by State

imports from Canada. The location of these states is shown in Figure 3-2. Once again the dominant states are in the North Central and Mid-Atlantic regions. The obvious exceptions are California (fourth largest) and Texas (ninth largest) and, in this case, Washington, which is the sixth largest importing state.

The picture from the Canadian perspective is similar. As can be seen in Table 3-5, Ontario is the "destination"[4] of 59 percent of U.S. exports to Canada. Figure 3-3 shows vividly the degree of concentration paralleling that in the U.S., Ontario and Quebec in the east and British Columbia in the west.

The Canadian province of origin data indicated less concentration and the presence of Alberta as a major source of imports to the U.S. These points can be seen in Table 3-6 and Figure 3-4.

The composition of exports and imports is shown in Table 3-7. For the analysis, the various commodities traded between the two countries were consolidated into seven groups. The purpose of the consolidation is to reflect the major commodities being traded without obscuring the analysis with excess detail. The foreign trade data supplied by the Bureau of the Census was coded at the two digit level of the harmonized codes used for tariff purposes. From this data six major commodity classes were identified, related but relatively minor flows were consolidated with these major flows, unrelated and minor flows were grouped into a miscellaneous class. Detailed listings of this classification scheme are found in the technical appendices.

For 1992, the dominance of manufactured goods can be seen in Table 3-7. Machinery and appliances and vehicles represent nearly 47 percent of imports and just over 60 percent of exports. For these two groups, the U.S. runs a positive balance of trade. The other major commodity groups are agricultural (including processed food stuffs) for which trade is quite balanced; minerals and metals (including energy products) for which Canada runs a positive balance of trade; and chemicals and plastics, for which the U.S. exports more than it imports. These relationships have remained relatively constant, as can be seen in the 4-year historical data presented in Tables 3-8 and 3-9.

3.3 U.S.-CANADA LAND TRADE

That trade between the U.S. and Canada moves primarily by land was noted above. This point is reinforced by charts shown in Tables 3-10 and 3-11. Because the land modes dominate the trade flows, it is most critical that the land trade patterns be explored and understood.

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[4]Neither U.S. nor Canadian data give details on the destination province of U.S. exports to Canada. Thus, for this analysis, the province of entry is used as a proxy for the destination province. This is probably a very realistic approach for most of Canada. Unfortunately, it no doubt overstates Ontario's share.

Figure 3-2. 1992 US Imports from Canada by State (in dollars)

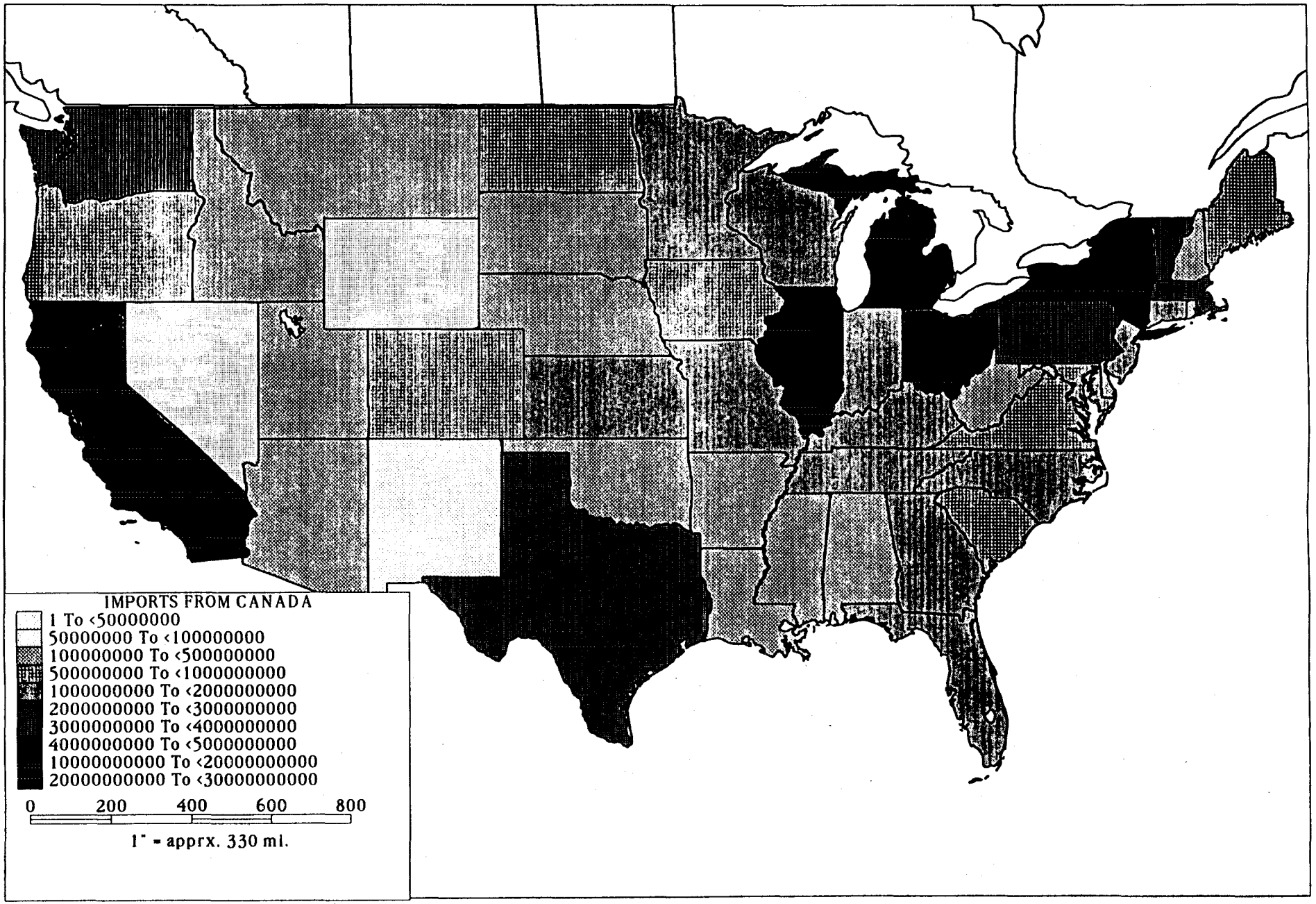
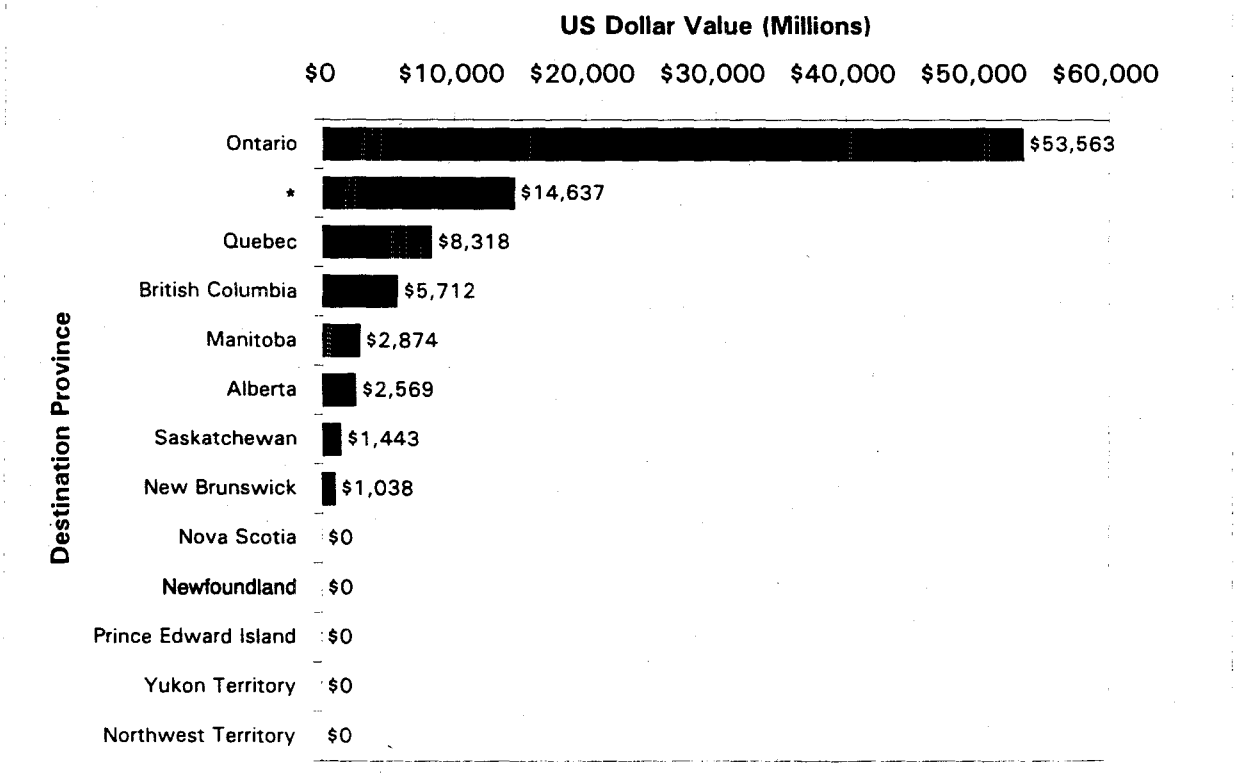


TABLE 3-5. 1992 US TOTAL EXPORTS TO CANADA BY PROVINCE

	PROVINCE	VALUE	Value %	TRANSITS	Transit %
ON	Ontario	$53,562,937,930	59%	2,559,321	59%
	*	$14,637,097,956	16%	713,630	16%
PQ	Quebec	$8,317,674,431	9%	326,324	9%
BC	British Columbia	$5,711,883,282	6%	340,862	6%
MB	Manitoba	$2,874,202,500	3%	129,424	3%
AB	Alberta	$2,568,882,066	3%	114,717	3%
SK	Saskatchewan	$1,443,331,519	2%	67,465	2%
NB	New Brunswick	$1,038,499,409	1%	59,222	1%
NS	Nova Scotia	$0	0%	0	0%
NF	Newfoundland	$0	0%	0	0%
PE	Prince Edward Island	$0	0%	0	0%
YT	Yukon Territory	$0	0%	0	0%
NT	Northwest Territory	$0	0%	0	0%
	Totals	$90,154,509,093	100%	4,310,965	100%



*Not classified by Province

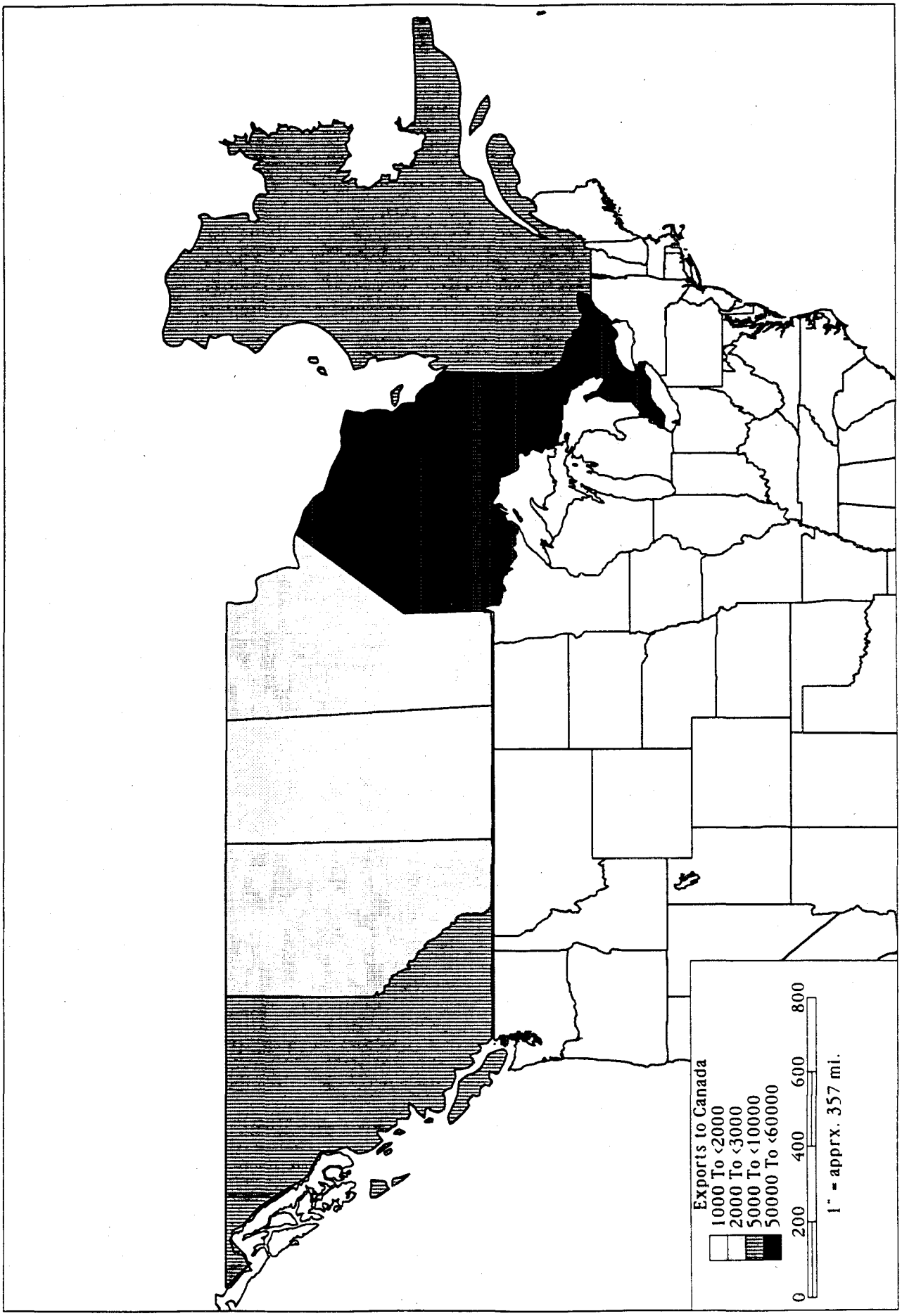
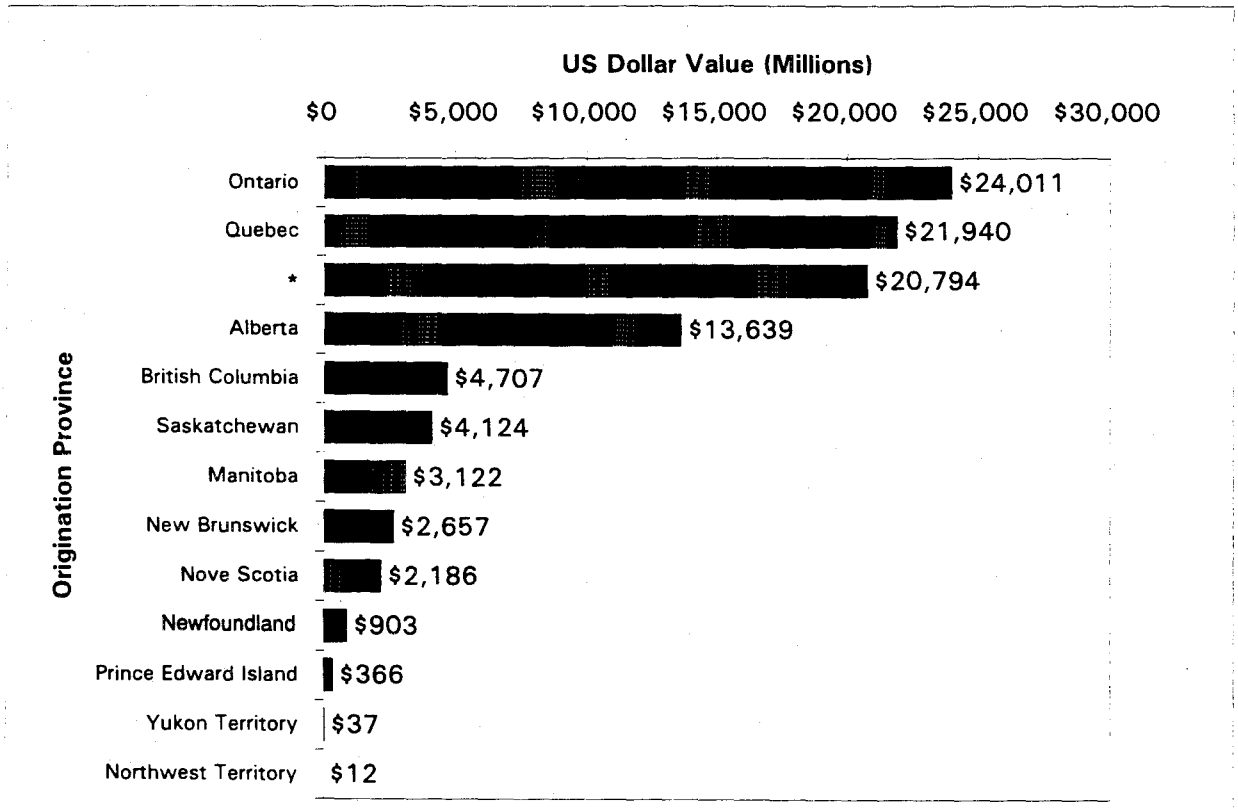


Figure 3-3. 1992 US Exports to Canada by Province (in millions of US dollars)

TABLE 3-6. 1992 U.S. TOTAL IMPORTS FROM CANADA BY PROVINCE

	PROVINCE	VALUE	Value %	TRANSITS	Transit %
ON	Ontario	$24,010,999,447	24%	986,140	27%
PQ	Quebec	$21,940,265,745	22%	800,905	22%
	*	$20,794,397,553	21%	599,305	16%
AB	Alberta	$13,638,654,776	14%	328,772	9%
BC	British Columbia	$4,706,770,554	5%	270,513	7%
SK	Saskatchewan	$4,123,671,895	4%	179,698	5%
MB	Manitoba	$3,121,979,282	3%	159,910	4%
NB	New Brunswick	$2,656,656,207	3%	143,355	4%
NS	Nove Scotia	$2,185,700,788	2%	114,558	3%
NF	Newfoundland	$903,146,327	1%	40,972	1%
PE	Prince Edward Island	$366,132,156	0%	33,196	1%
YT	Yukon Territory	$36,997,203	0%	2,530	0%
NT	Northwest Territory	$11,813,710	0%	1,160	0%
	Totals	$98,497,185,643	100%	3,661,014	100%



*Not classified by Province

Figure 3-4. 1992 US Imports from Canada by Province (in millions of US dollars)

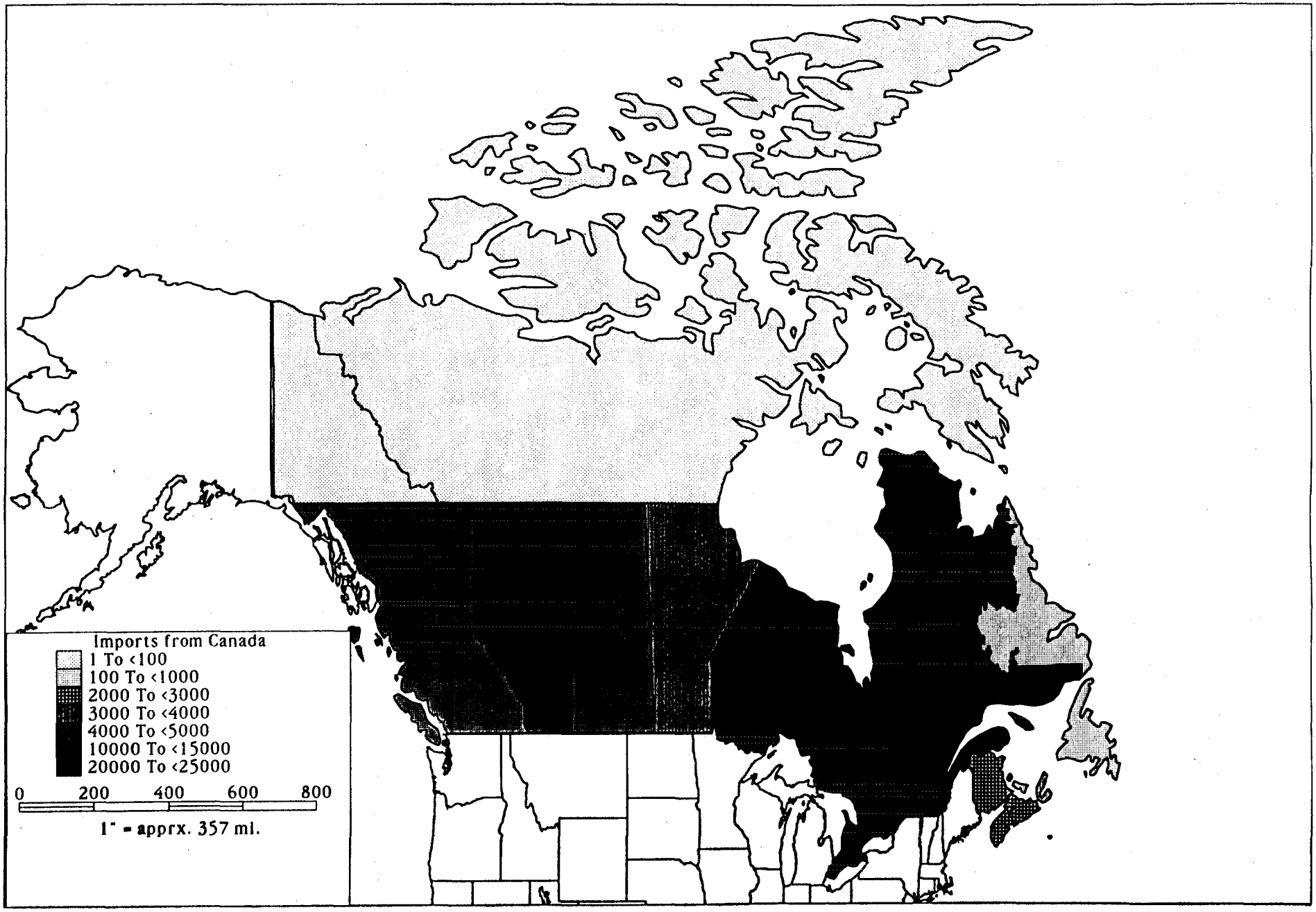
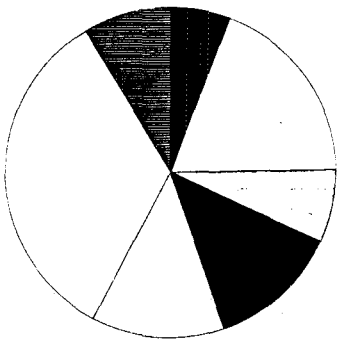


TABLE 3-7. Composition of 1992 US Trade with Canada

Commodity Class	Total Imports	Total Exports
Agricultural	$5,827,310,292	$5,796,476,065
Minerals and Metals	$18,784,689,469	$7,715,237,669
Chemicals and Plastics	$7,045,954,206	$10,135,405,299
Wood/Paper/Pulp	$12,620,234,602	$4,675,417,359
Machinery and Appliances	$12,763,338,265	$28,610,845,565
Vehicles	$33,094,550,949	$25,658,085,596
Miscellaneous	$8,361,107,860	$7,563,041,540
Totals	**$98,497,185,643**	**$90,154,509,093**

Composition of the Total Imports in 1992



Composition of the Total Exports in 1992

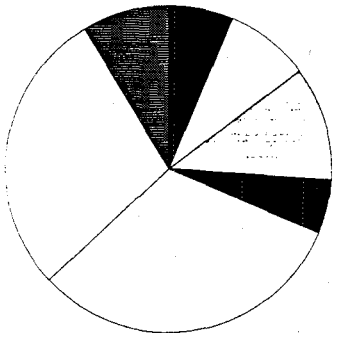


TABLE 3-8. U.S. EXPORTS TO CANADA BY COMMODITY

COMMODITY CLASS	1989		1990		1991		1992	
	$ mil	%	$ mil	%	$ mil	%	$ mil	%
AGRICULTURAL	2632	3	5050	6	5504	6	5796	6
MINERALS/METALS	5541	7	8233	10	7332	9	7715	9
CHEMICALS/PLASTICS	5811	7	8492	10	9236	11	10135	11
WOOD/PAPER/PULP	2539	3	4070	5	4392	5	4675	5
MACHINE/APPLIANCES	17379	22	25813	31	26492	31	28611	32
VEHICALS	20929	27	24392	29	24832	29	25658	28
MISCELLANEOUS	23434	30	6916	8	7358	9	7563	8
TOTAL	78226	100	82967	100	85146	100	90155	100

TABLE 3-9. U.S. IMPORTS FROM CANADA BY COMMODITY

COMMODITY CLASS	1989		1990		1991		1992	
	$ mil	%	$ mil	%	$ mil	%	$ mil	%
AGRICULTURAL	4467	5	4722	5	5032	6	5827	6
MINERALS/METALS	16964	19	18062	20	17963	20	18785	19
CHEMICALS/PLASTICS	5687	6	6059	7	6128	7	7046	7
WOOD/PAPER/PULP	13176	15	12662	14	11703	13	12620	13
MACHINE/APPLIANCES	11209	13	12015	13	12237	13	12763	13
VEHICALS	30072	34	30865	34	30336	33	33095	34
MISCELLANEOUS	6635	8	6898	8	7666	8	8361	8
TOTAL	88210	100	91372	100	91064	100	98497	100

TABLE 3-10. 1992 US Exports to Canada by Mode

MODE	Air	Water	Land	Total
Value	$6,394,212,123	$1,545,202,835	$82,215,094,135	$90,154,509,093

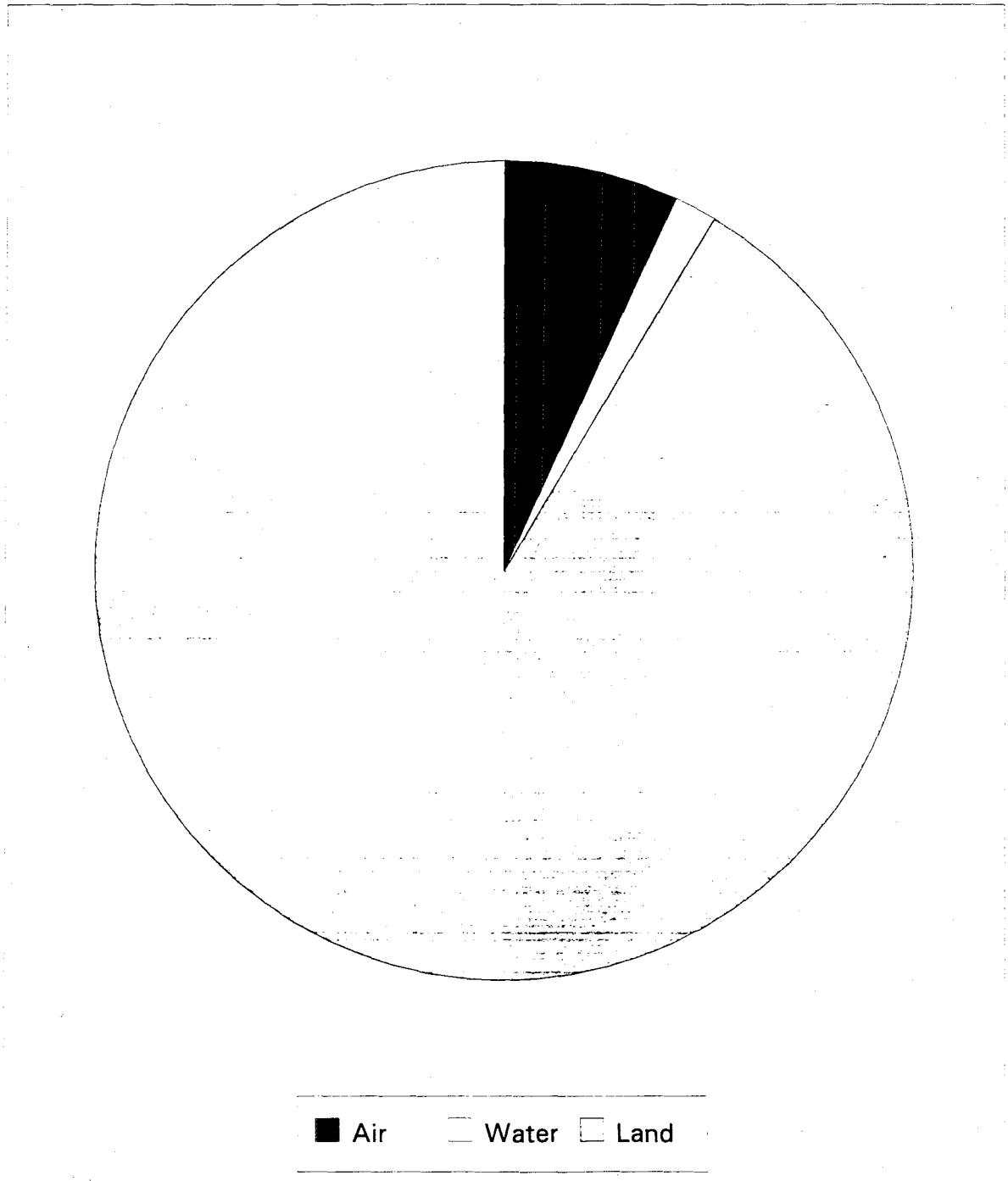
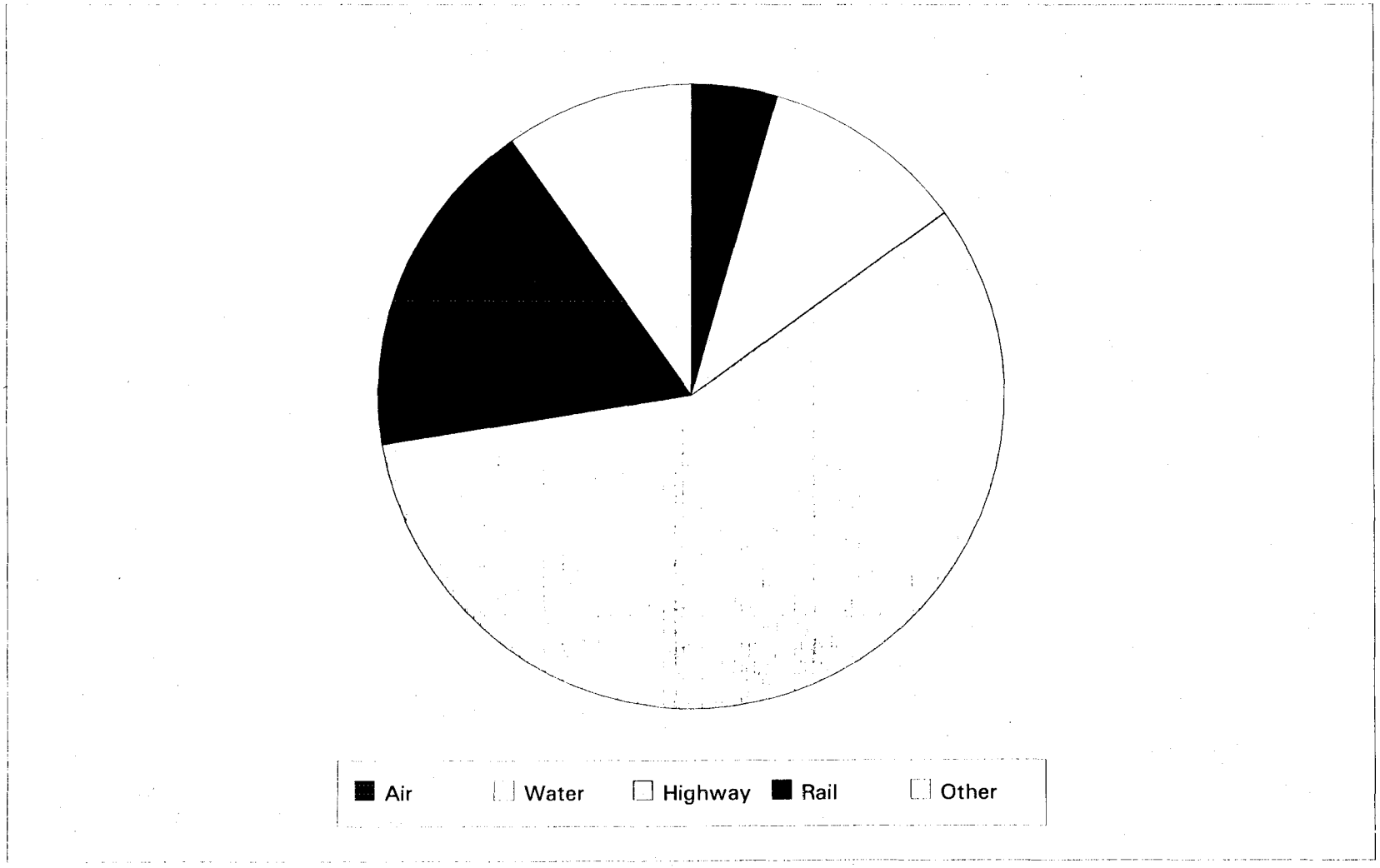


TABLE 3-11. 1992 US Imports from Canada by Mode

MODE	Air	Water	Highway	Rail	Other	Totals
Value	$4,543,617,486	$10,413,833,020	$56,672,885,763	$17,309,885,773	$9,556,963,601	$98,497,185,643



Just as trade in general is an eastern U.S./eastern Canada activity, the land borne trade is concentrated in the East. The information in Table 3-12 shows that land exports to Canada in 1992 were $82 billion. Of this, 74.6 percent crossed through eastern ports of exit and 15.7 percent crossed through western ports. (Nearly 10 percent of the movements were neither highway nor rail crossings and consequently were classified as other crossings without regard to east or west.) Both eastern and western trade grew over the four years shown, the West increase approximately 41 percent and the East, based on the data, nearly 53 percent. This last figure is distorted by a data quirk, a change in classification that is apparent in looking at the trends for eastern crossings and other crossings. A more realistic estimate of the growth in eastern trade flows likely would be nearer 15 percent.

U.S. imports from Canada demonstrate the same type of pattern as seen in exports, 75.8 percent of the crossings are in the East and 16.5 percent are in the West, as seen in Table 3-13. (About 8 percent are non-highway, non-rail crossings.) Both eastern and western trade are up from 1989 to 1992, but this includes two years of declining imports in the East and relatively flat level of imports in the West.

Participants at the Roundtable sessions held by FHWA to get regional input into the study process indicated that dollar values imports and exports may mask changes in the commodity mixes crossing the border. They expressed a preference for physical measures to account for the transportation consequences of the trade flows. Unfortunately, there is no common physical measure used for the land modes. Instead, a proxy variable for shipments was defined as the number of records in the foreign trade database. This variable falls short of being an ideal proxy since it does not differentiate between large and small cargos or multiple vehicles summarized in a single Customs' record. However, to the extent that the relationships among the shipments remain relatively constant, customs' records may track shipments well. In one sense, this is a very appropriate variable to use as a measure of work load imposed on the Federal Inspection Services.

Tables 3-14 and 3-15 contain the 4-year trends of exports and imports to Canada measured in terms of 'shipments.' The relationships between shipments and value measures are close but the differences are informative. Eastern exports account for nearly 75 percent of the shipments just as they accounted for 75 percent of the value. Western exports are only a slightly higher percentage of shipments than of value. Western shipments have remained virtually flat over the four year period, but eastern shipments have grown. (Although they have not grown at the rate implied by the graph on Table 3-14. The initial 1989 shipment figure is misleadingly low.)

Imports measured in terms of shipments show a somewhat different picture. Eastern import shipments grew more rapidly than the value of trade. This could reflect a shift to lower valued commodities or, as is more likely, a shift to more frequent, smaller shipments of the same commodities.

The number of western shipments remained constant over the 4-year period while the value of trade increased by 13 percent. Although a part of the increase in value may be

TABLE 3-12. Trend in Land Exports to Canada by Region

YEAR	East Crossings	West Crossings	Other Crossings	Total Land
1989	$40,154,262,389	$9,120,240,103	$20,893,553,384	$70,168,055,876
1990	$57,115,703,310	$10,293,739,914	$7,582,986,362	$74,992,429,586
1991	$57,788,372,193	$12,204,570,468	$7,801,636,127	$77,794,578,788
1992	$61,359,975,267	$12,881,409,175	$7,973,709,693	$82,215,094,135

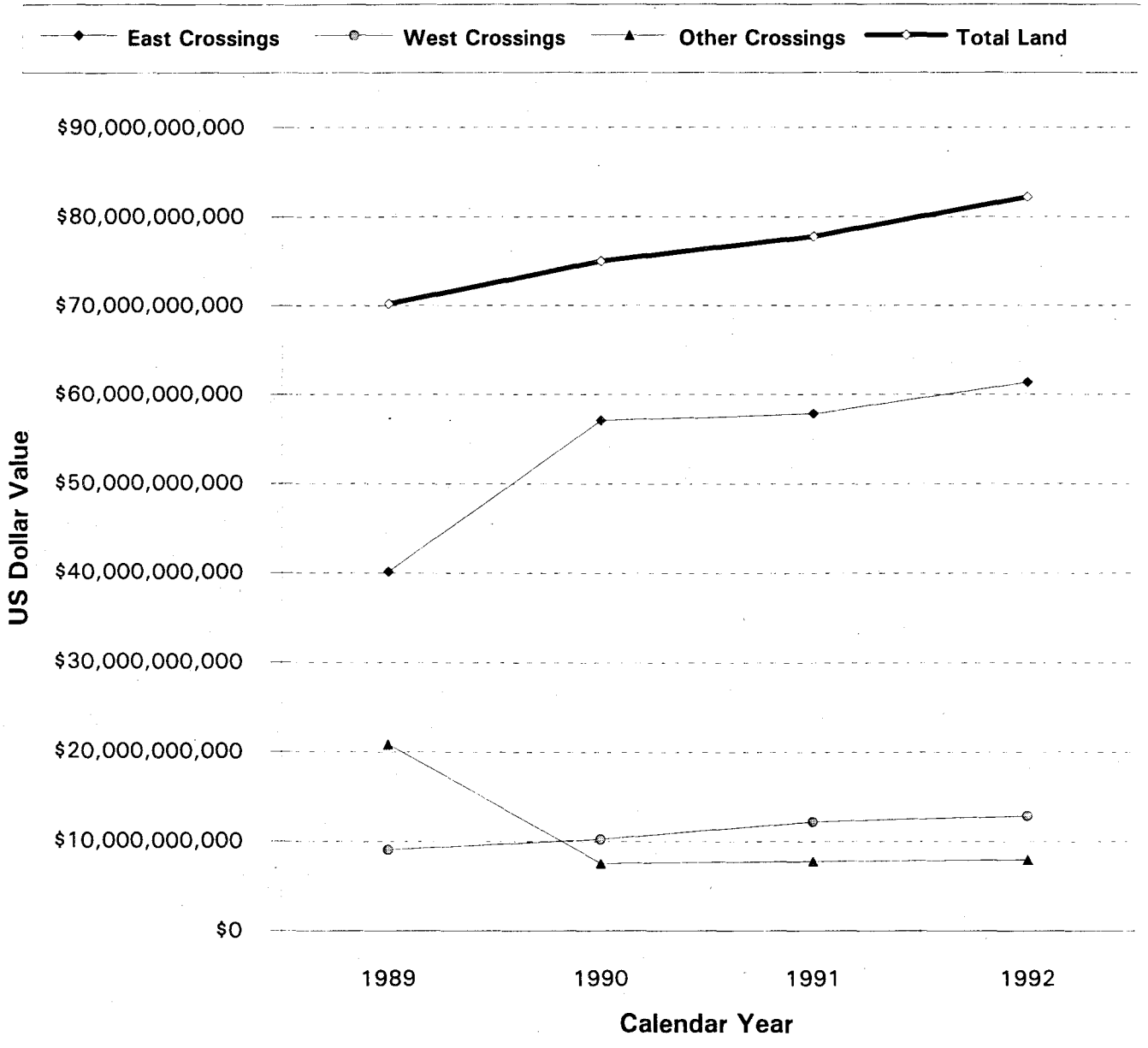


TABLE 3-13. Trend in Land Imports from Canada by Region

YEAR	East Crossings	West Crossings	Other Crossings	Total Land
1989	$61,327,349,142	$12,192,521,516	$8,027,596,576	$81,547,467,234
1990	$59,106,930,625	$12,802,435,150	$6,472,374,177	$78,381,739,952
1991	$57,761,776,801	$12,654,722,033	$6,099,326,333	$76,515,825,167
1992	$63,325,637,305	$13,774,524,759	$6,439,573,073	$83,539,735,137

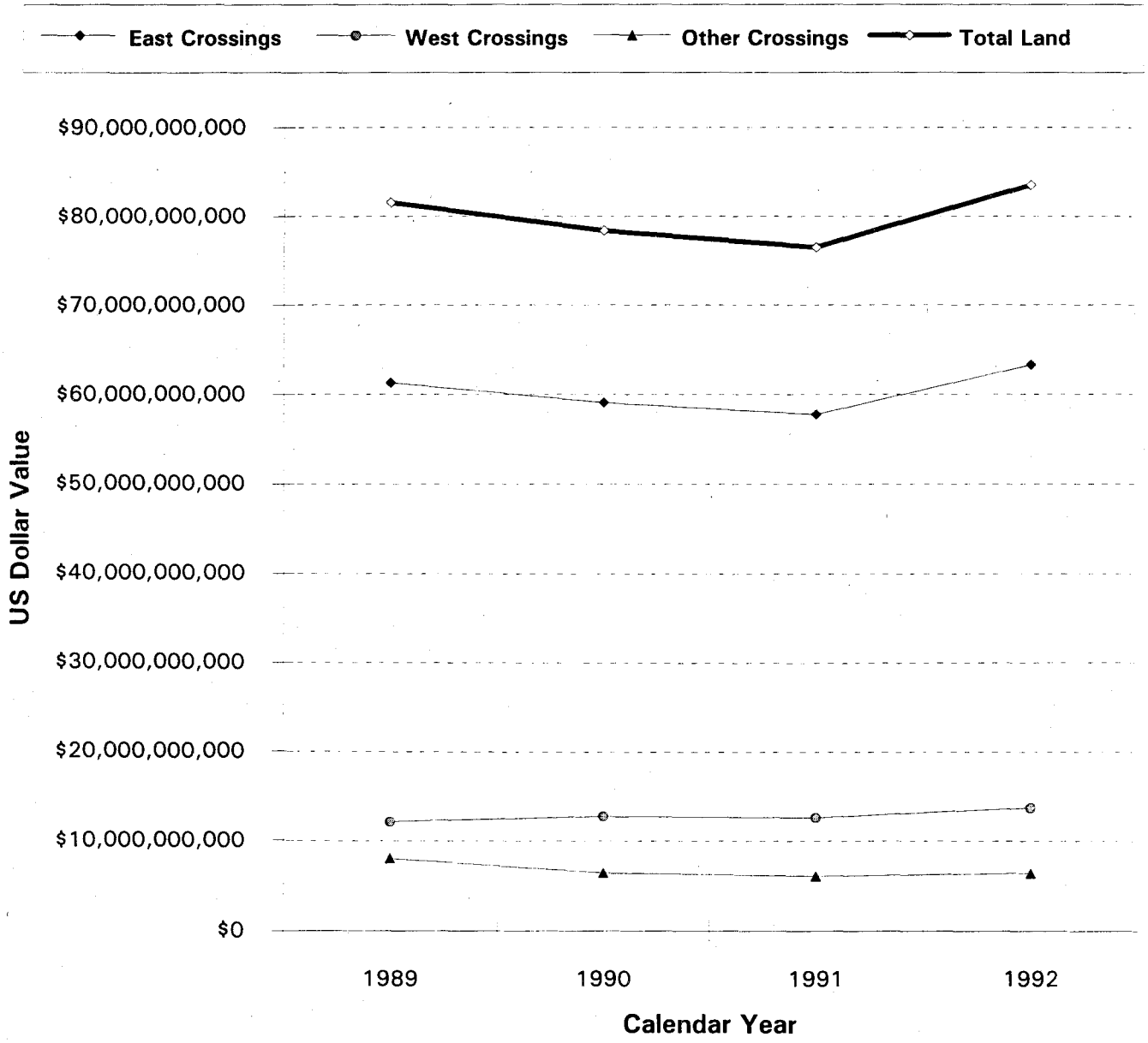


TABLE 3-14. Trend in Land Exports to Canada by Region
Number of Shipments

YEAR	East Crossings	West Crossings	Other Crossings	Total Land
1989	1,760,421	650,521	38,017	2,448,959
1990	2,605,378	594,966	289,031	3,489,375
1991	2,643,577	607,541	335,763	3,586,881
1992	2,892,128	658,230	336,658	3,887,016

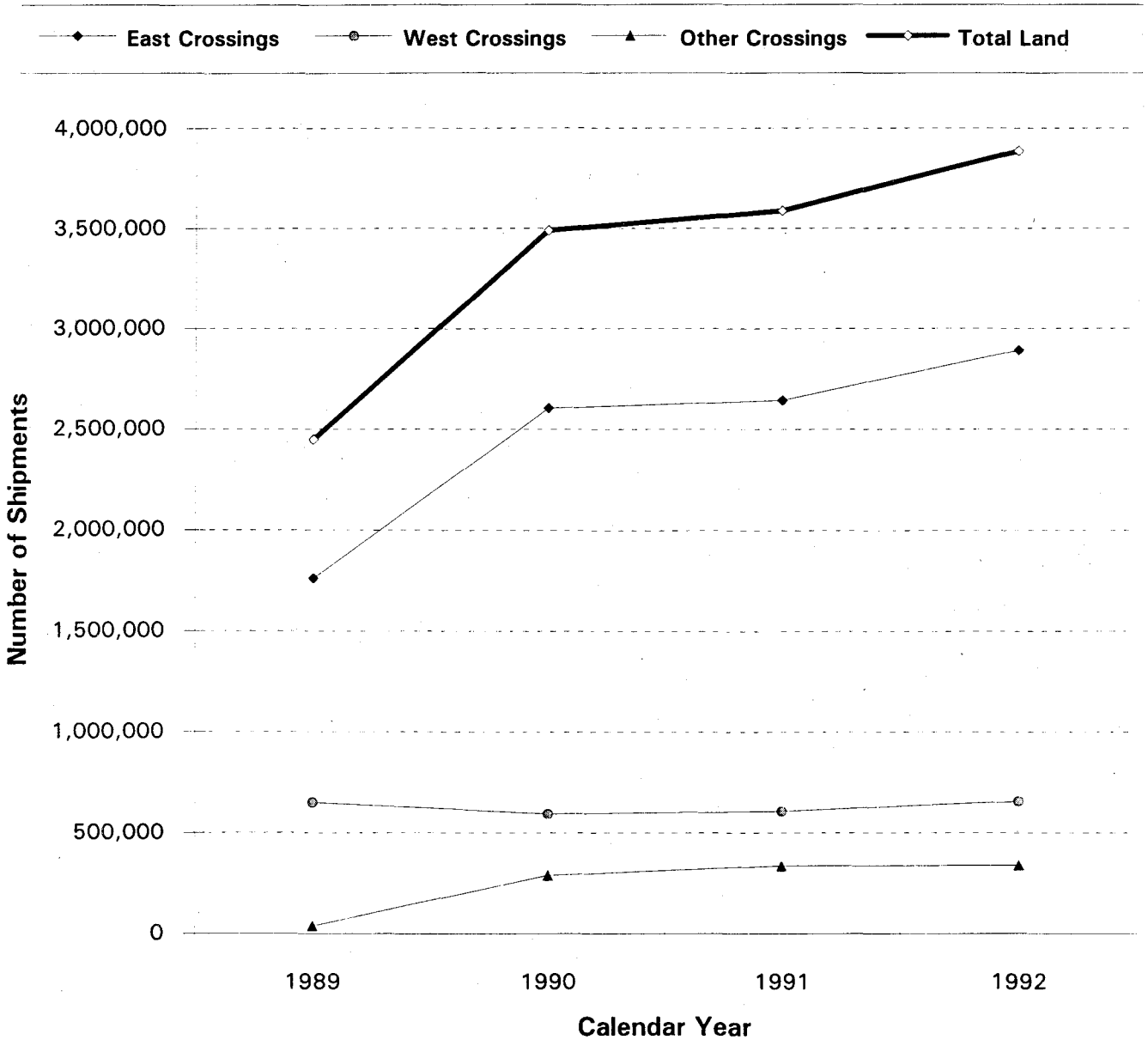
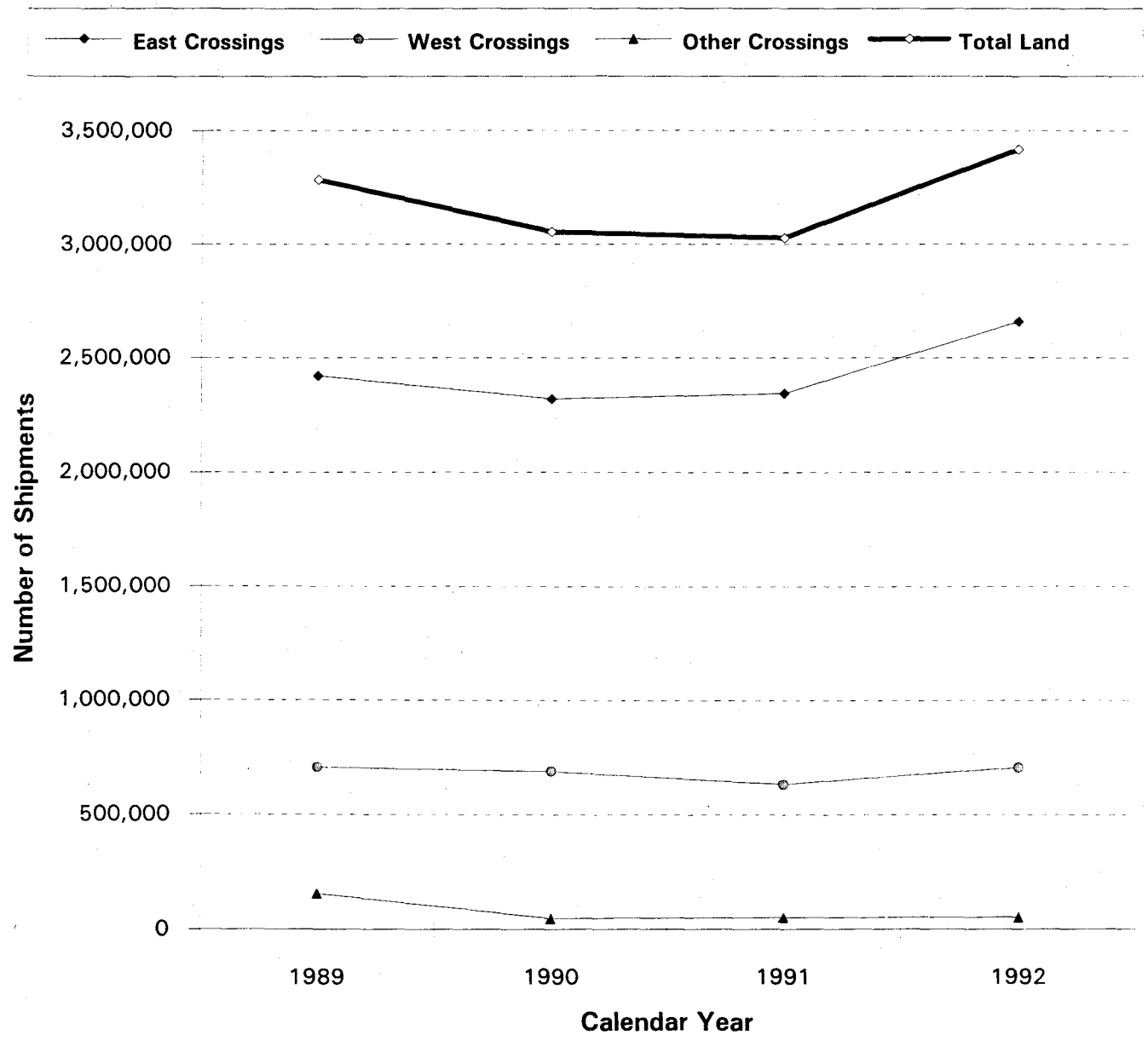


TABLE 3-15. Trend in Land Imports from Canada by Region
Number of Shipments

YEAR	East Crossings	West Crossings	Other Crossings	Total Land
1989	2,420,561	706,794	156,351	3,283,706
1990	2,319,569	687,744	47,273	3,054,586
1991	2,343,809	632,860	50,567	3,027,236
1992	2,658,800	706,915	53,047	3,418,762



attributable a shift to higher valued commodities in the West, it is more likely that this results from moderate price inflation (the consumer price index also rose by 13 percent over this period).

The concentration of the majority of the trade to a few states and provinces noted in the discussion of total trade also should be expected to be true for trade by land modes, as is the case. The distributions are quite similar. In value terms, Michigan is the largest exporting and importing state, the top seven states account for more than half the trade (50.8 percent of exports and 56.3 percent of imports), and the only non-eastern states among the top seven are California for exports and imports and Washington for imports. When measured in terms of shipments, there is marginally greater concentration among eastern states. The distributions depicting these relations are in Tables 3-16 to 3-19.

The distributions of import and export origins and destinations by Canadian provinces are likewise concentrated among few provinces. For U.S. exports to Canada, Ontario is the destination of 64 percent of the flows. (Recall that the data do not permit identifying true destinations so that the figures reported here represent the province of entry. The figures for Ontario must be overstated by the amount of trade entering Ontario, but bound to other provinces, mainly to the east.) U.S. imports from Canada by land originate primarily in Quebec, Ontario, and Alberta. This information is contained in Tables 3-20 and 3-21.

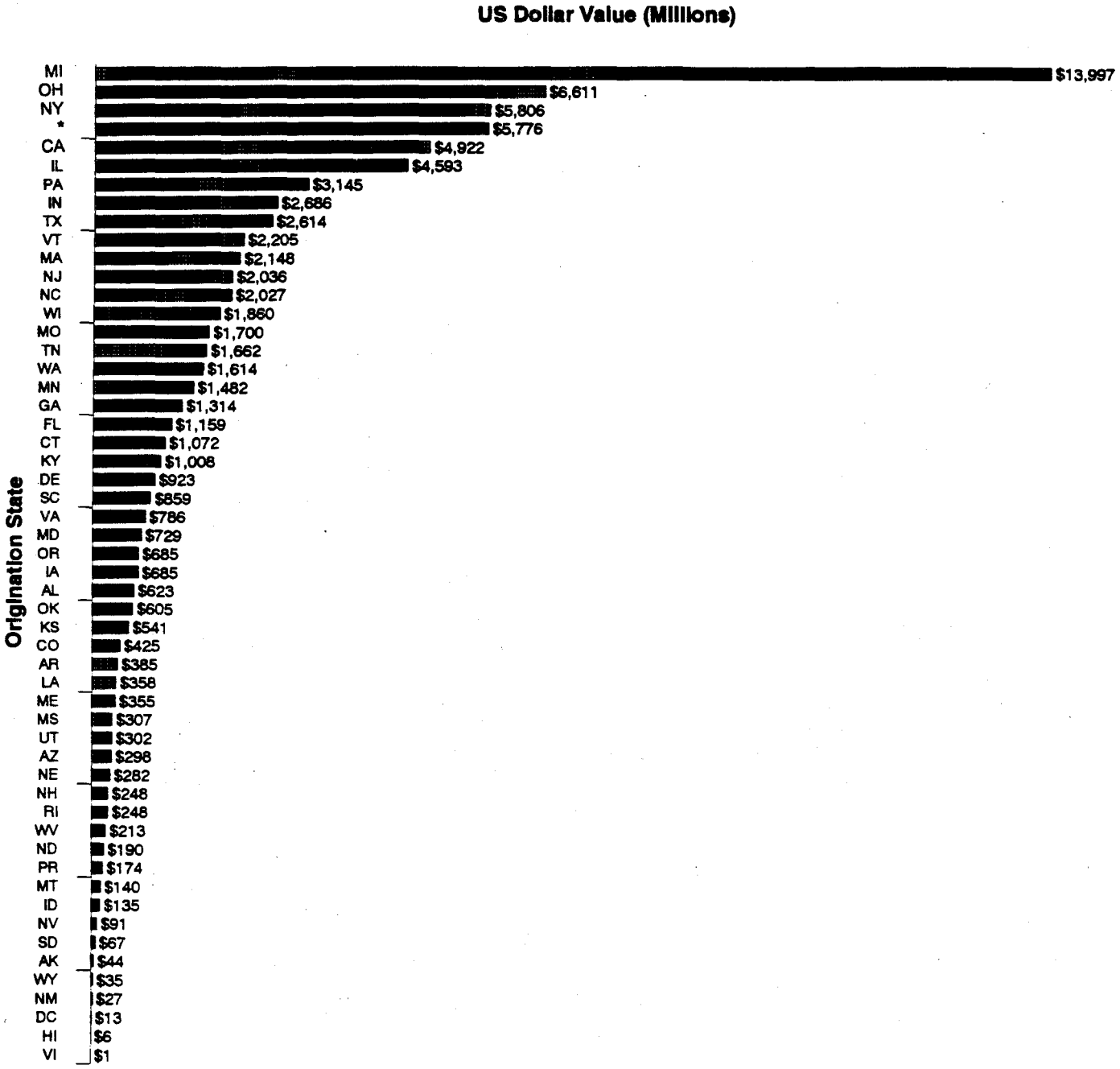
Given that relatively few states are doing most of the trading with relatively few provinces, the border crossings handling most of the trade should be few in number. That they are is shown in Tables 3-22 and 3-23 for exports and Tables 3-24 and 3-25 for imports.[5] In dollar terms, the Detroit area crossings account for 27.8 percent of the exports by land and 24.4 percent of the imports. The top three ports, Port Huron, Detroit, and Buffalo-Niagara, account for 59.3 percent of the exports and 56.2 percent of the imports. These percentages, of course, are higher if based only on highway and rail borne trade.

After these ports, the most significant flows occur in the corridor extending south from Montreal and crossing at either Champlain-Rouses Point in New York or at Highgate Springs, Vermont. These two gateways account for an additional 9.5 percent of the two-way, land based trade. The western Washington crossings are the largest gateway in the West, and they account for 5.2 percent of two-way land trade.

Of the two way trade of $188.6 billion, 87.9 percent is moved by land. As a result the composition of this trade by land parallels that of total trade. The overall pattern is shown in Table 3-26. The U.S. has a favorable balance of trade in chemical and plastics and machinery and appliances. Canada has a favorable balance of trade in mineral and metals and wood/paper/pulp. Agricultural products and vehicles are balanced in flows.

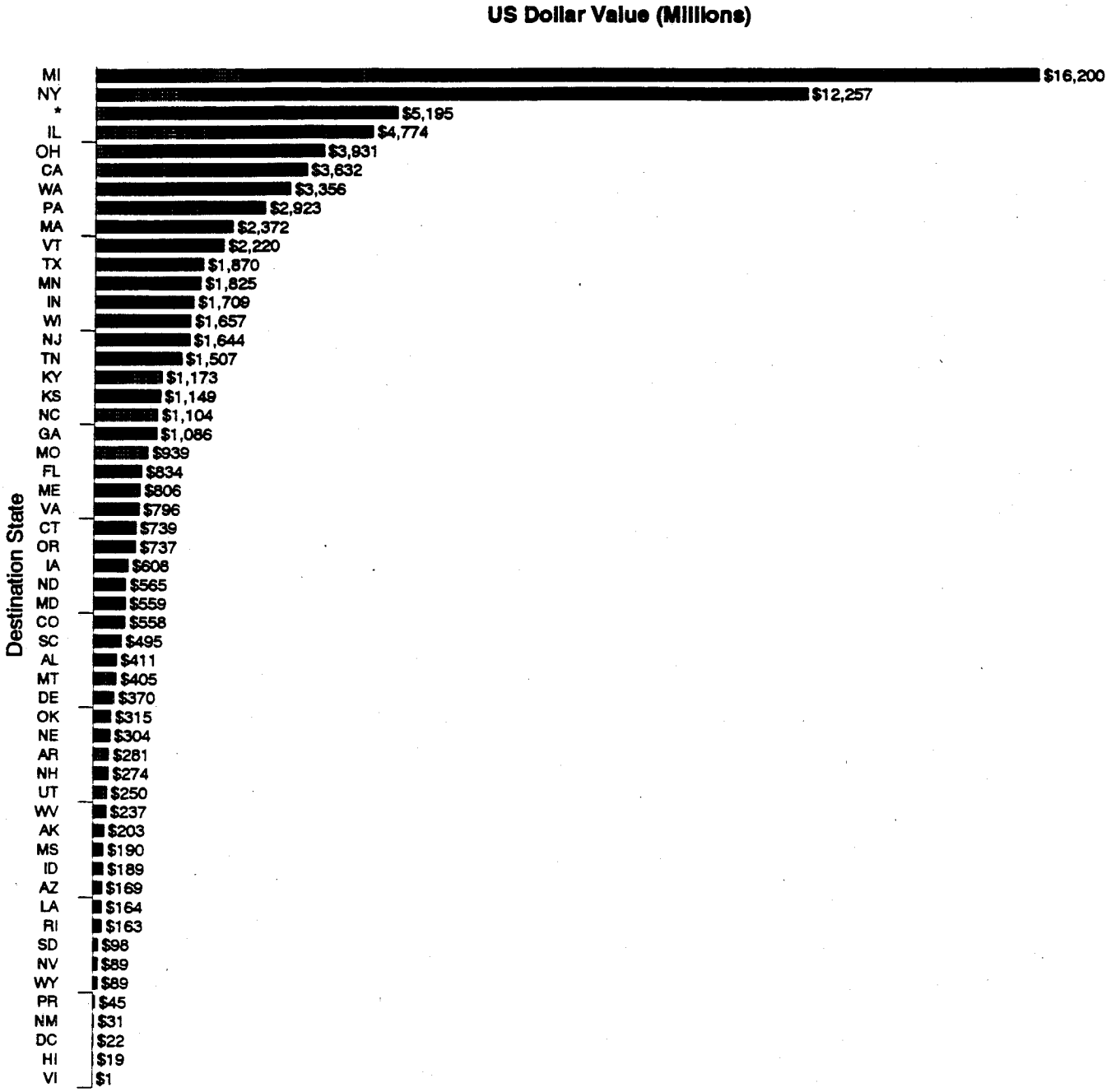
[5]The border crossings listed here are actually Customs ports or consolidations of ports. These have been identified to give adequate geographic representation to the U.S.-Canada border. For the East, all commercial ports are included.

TABLE 3-16. U.S. LAND EXPORTS TO CANADA BY STATE, 1992



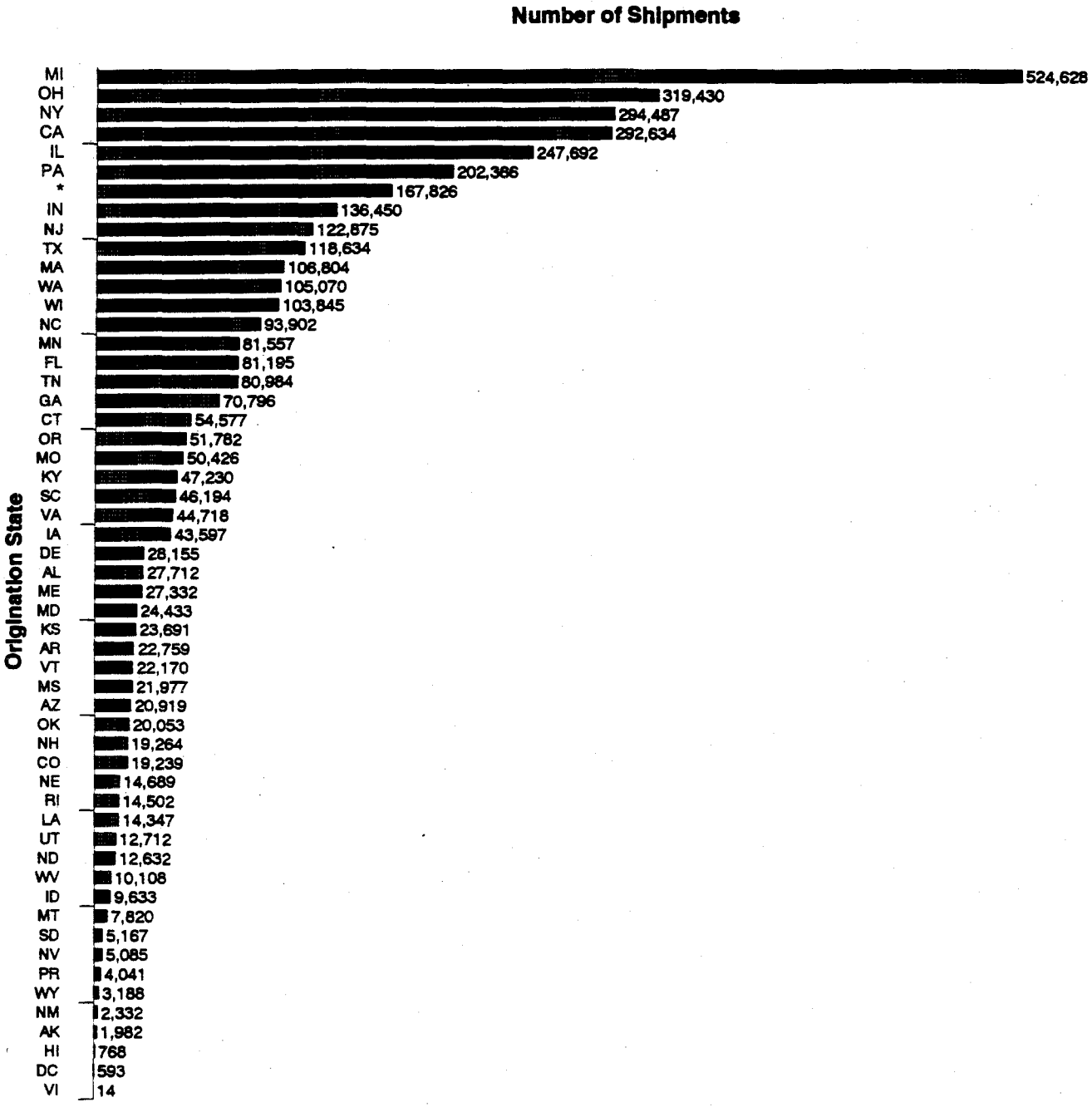
*Not classified by State

TABLE 3-17. U.S. LAND IMPORTS FROM CANADA BY STATE, 1992



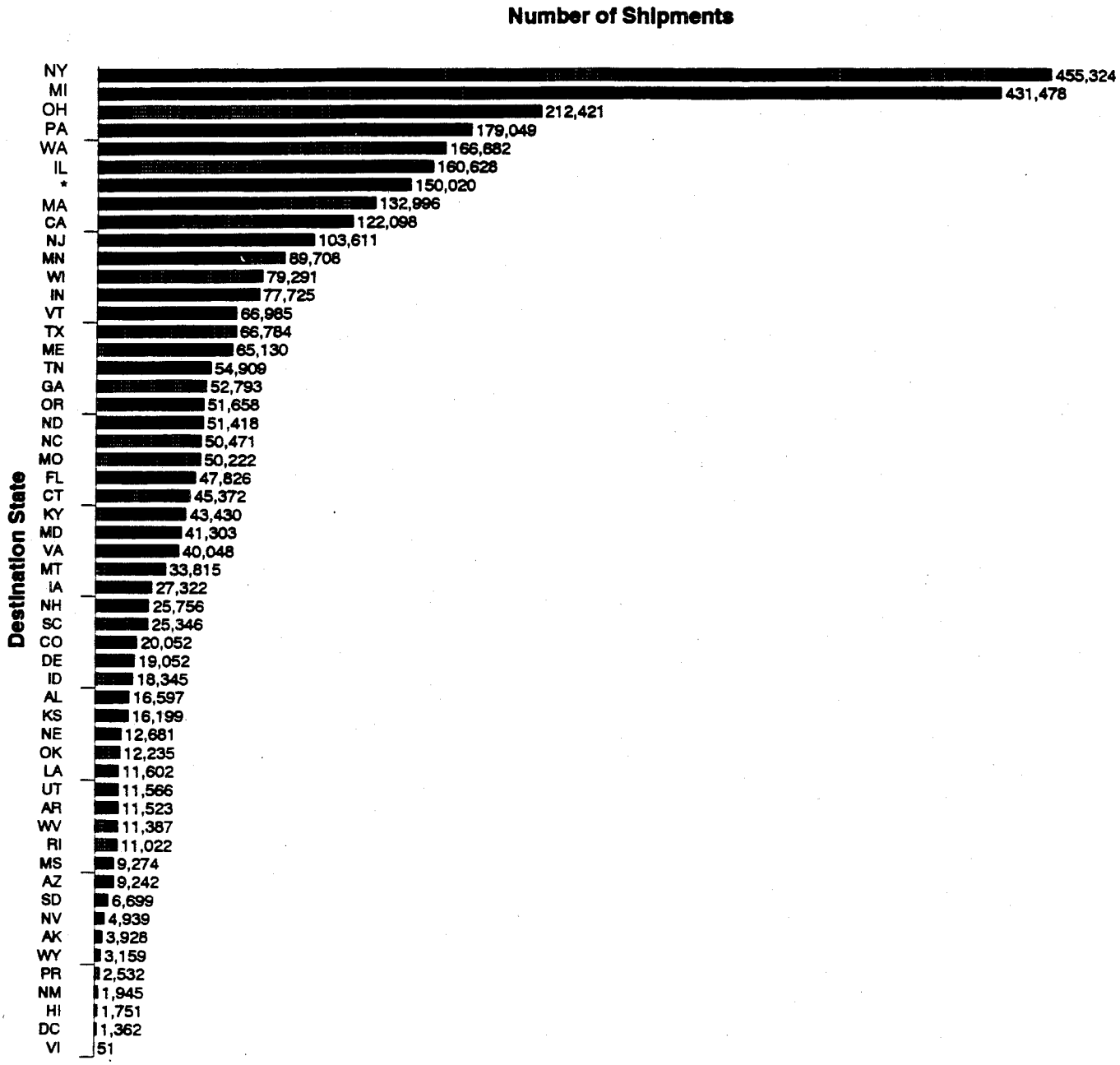
*Not classified by State

TABLE 3-18. U.S. LAND EXPORT SHIPMENTS TO CANADA BY STATE, 1992



*Not classified by State

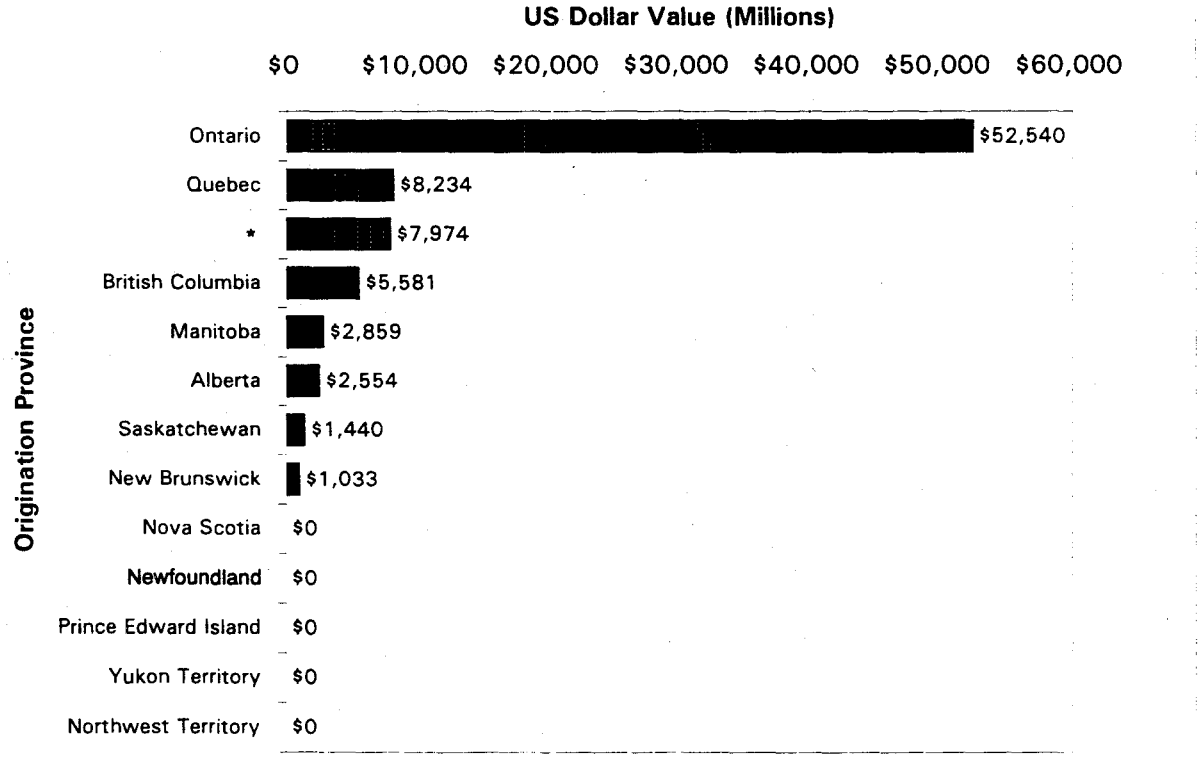
TABLE 3-19. U.S. LAND IMPORT SHIPMENTS FROM CANADA BY STATE, 1992



*Not classified by State

TABLE 3-20. 1992 U.S. LAND EXPORTS TO CANADA BY PROVINCE

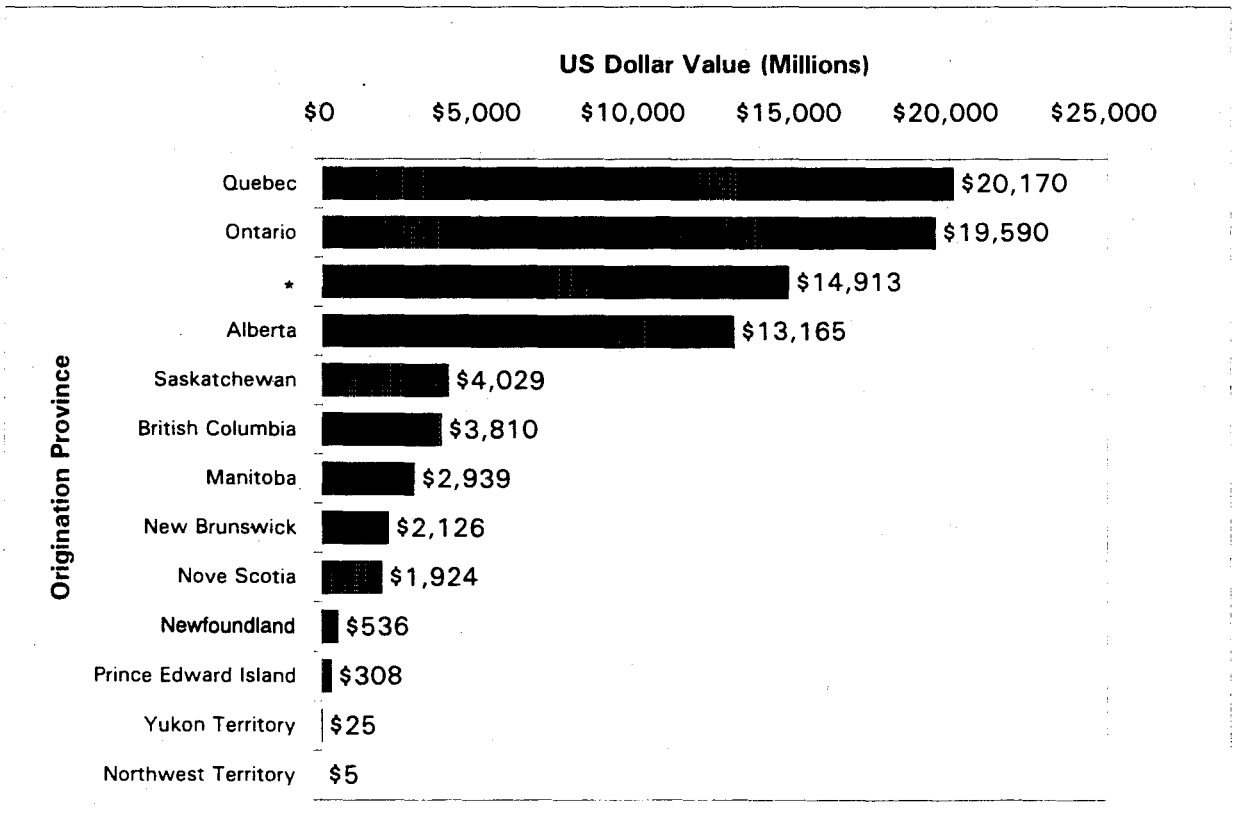
	PROVINCE	VALUE	Value %	TRANSITS	Transit %
ON	Ontario	$52,540,247,949	64%	2,528,281	65%
PQ	Quebec	$8,234,211,630	10%	324,327	8%
	*	$7,973,709,693	10%	336,658	9%
BC	British Columbia	$5,580,720,240	7%	329,096	8%
MB	Manitoba	$2,858,669,310	3%	128,533	3%
AB	Alberta	$2,554,229,127	3%	113,787	3%
SK	Saskatchewan	$1,440,350,108	2%	67,292	2%
NB	New Brunswick	$1,032,956,078	1%	59,042	2%
NS	Nova Scotia	$0	0%	0	0%
NF	Newfoundland	$0	0%	0	0%
PE	Prince Edward Island	$0	0%	0	0%
YT	Yukon Territory	$0	0%	0	0%
NT	Northwest Territory	$0	0%	0	0%
	Totals	$82,215,094,135	100%	3,887,016	100%



*Not classified by Province

TABLE 3-21. 1992 U.S. LAND IMPORTS FROM CANADA BY PROVINCE

	PROVINCE	VALUE	Value %	TRANSITS	Transit %
PQ	Quebec	$20,169,701,323	24%	743,090	22%
ON	Ontario	$19,589,574,836	23%	905,423	26%
	*	$14,912,824,916	18%	573,155	17%
AB	Alberta	$13,164,730,917	16%	311,709	9%
SK	Saskatchewan	$4,029,362,804	5%	172,936	5%
BC	British Columbia	$3,810,385,841	5%	247,188	7%
MB	Manitoba	$2,939,161,603	4%	152,725	4%
NB	New Brunswick	$2,125,628,981	3%	137,153	4%
NS	Nove Scotia	$1,923,578,849	2%	107,648	3%
NF	Newfoundland	$535,849,584	1%	38,283	1%
PE	Prince Edward Island	$308,344,850	0%	26,757	1%
YT	Yukon Territory	$25,401,641	0%	2,167	0%
NT	Northwest Territory	$5,188,992	0%	528	0%
	Totals	$83,539,735,137	100%	3,418,762	100%



*Not classified by Province

TABLE 3-22. VALUE OF TOTAL LAND EXPORTS TO CANADA BY BORDER CROSSING, 1992

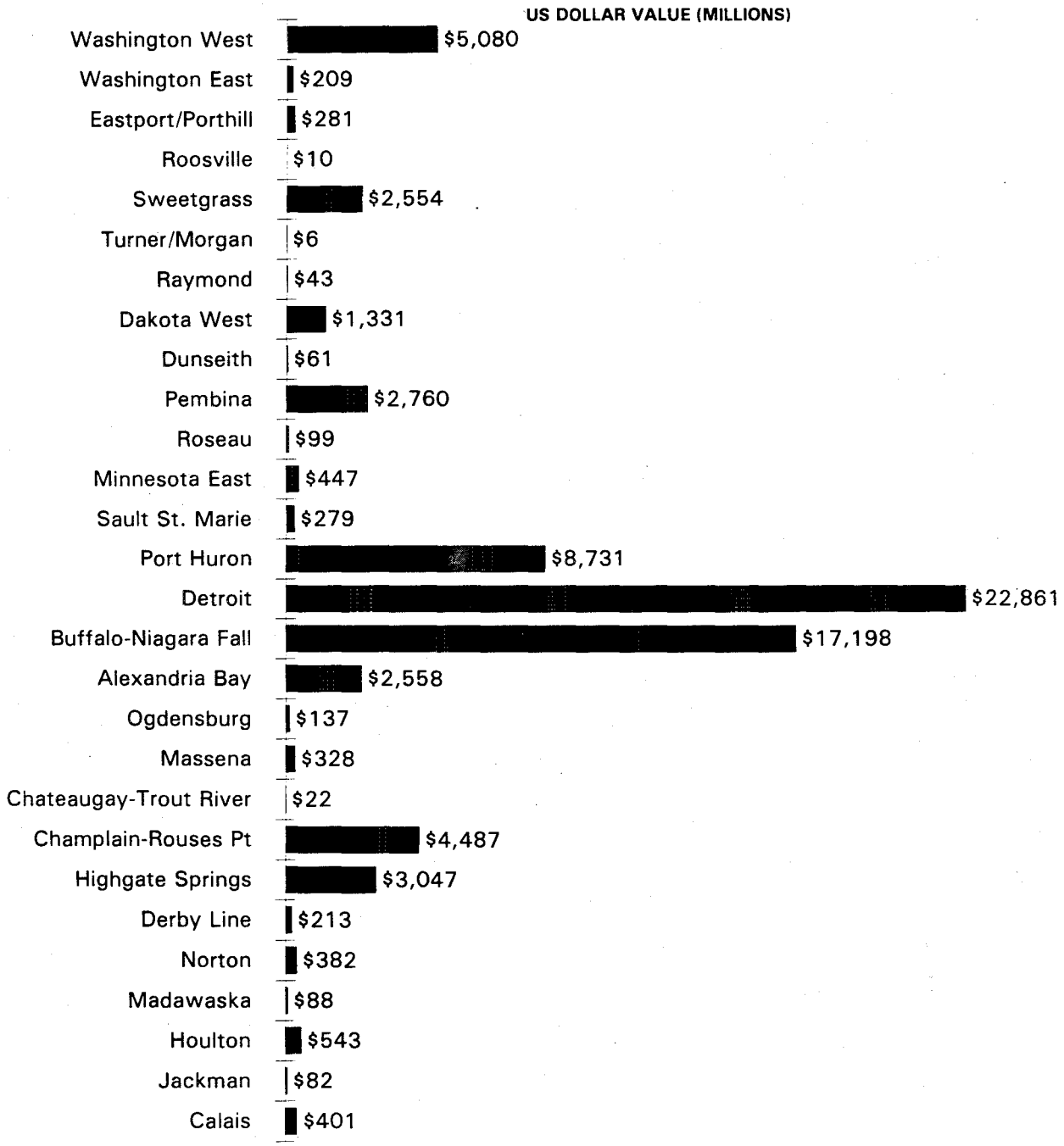


TABLE 3-23. EXPORT SHIPMENTS BY LAND TO CANADA BY BORDER CROSSING, 1992

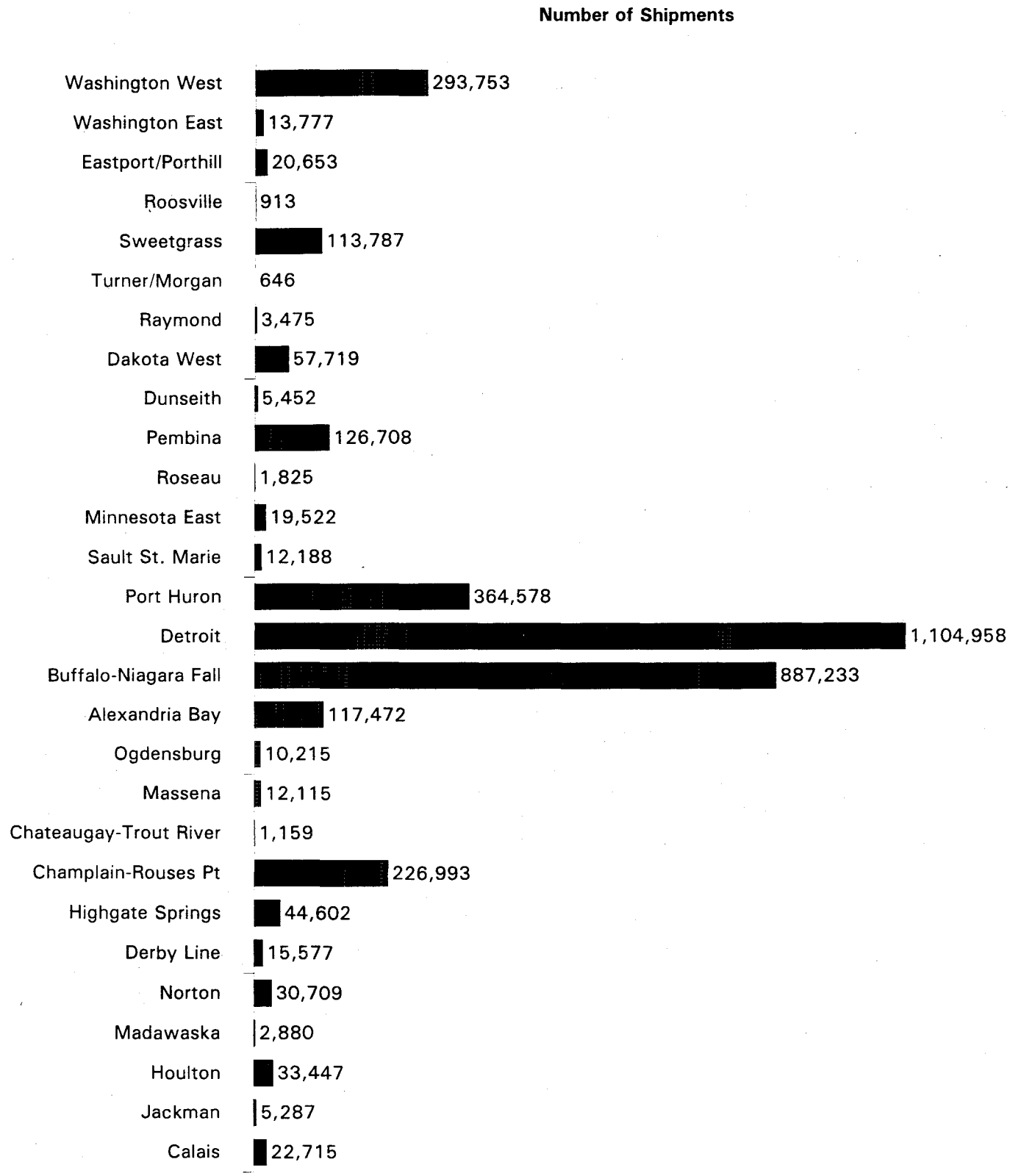


TABLE 3-24. VALUE OF TOTAL LAND IMPORTS FROM CANADA BY BORDER CROSSING, 1992

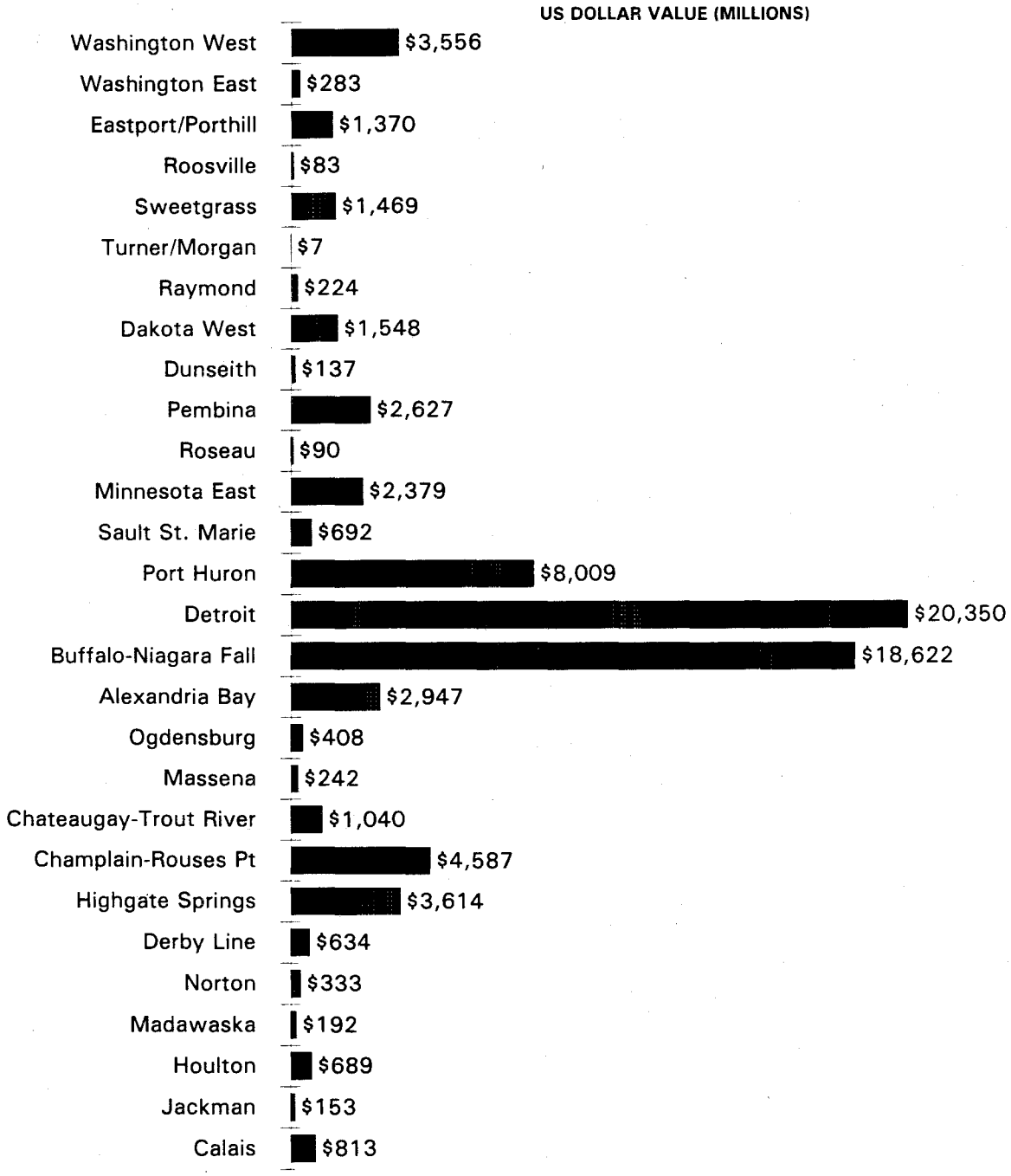


TABLE 3-25. IMPORT SHIPMENTS BY LAND FROM CANADA BY BORDER CROSSING, 1992

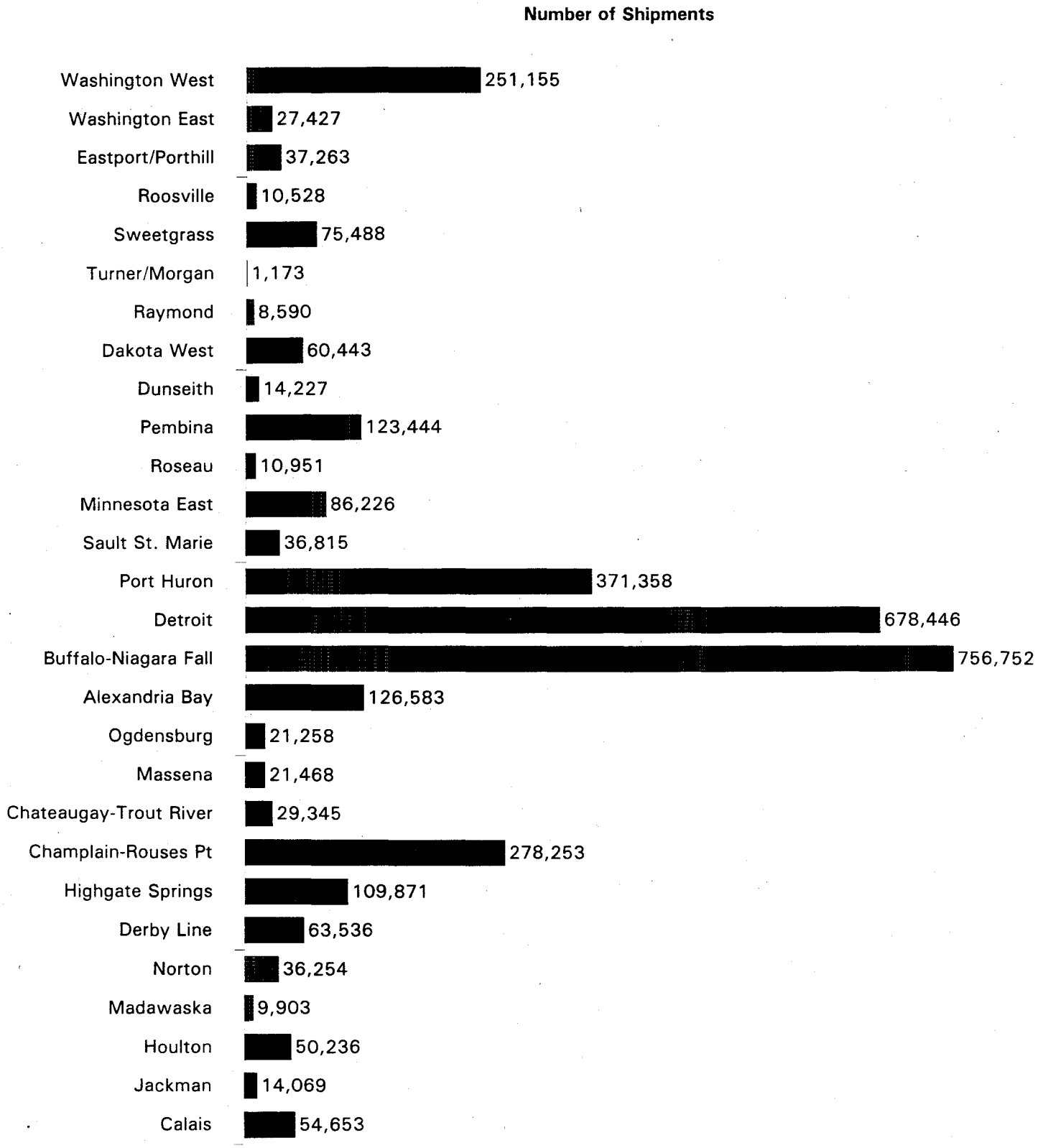
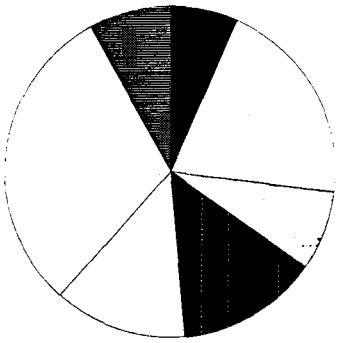


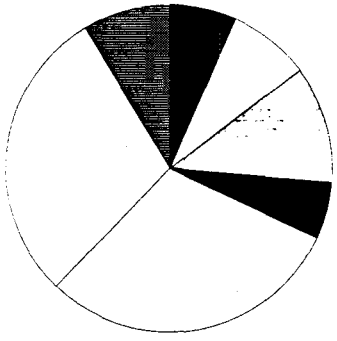
TABLE 3-26. Trade with Canada by Land by Commodity, 1992

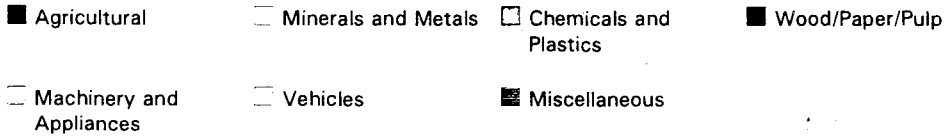
Commodity Class	Land Imports	Land Exports
Agricultural	$5,625,868,261	$5,686,025,292
Minerals and Metals	$17,046,488,588	$6,496,984,672
Chemicals and Plastics	$6,412,676,227	$9,533,635,995
Wood/Paper/Pulp	$11,699,001,241	$4,581,723,408
Machinery and Appliances	$10,795,231,002	$24,943,065,705
Vehicles	$25,411,522,133	$24,100,788,015
Miscellaneous	$6,548,947,685	$6,872,871,048
Totals	**$83,539,735,137**	**$82,215,094,135**

Composition of the Land Imports in 1992



Composition of the Land Exports in 1992





Nearly all agricultural products, 97.3 percent, move by land. Of the study defined commodity groups, Vehicles are the products least likely to move by land, with only 84.3 percent of the total going by these modes. This may reflect the role of aviation in moving parts and water in moving products in the Detroit-Windsor region.

3.4 EASTERN BORDER REGION TRADING PATTERNS

This section is a summary of the importance of various border regions to the trade between Canada and the U.S. in the broad commodity groups looked at above. The eastern ports vary substantially in terms of their locations with respect to major trade corridors. However, rather than treating each port separately, they have been grouped based upon a first approximation of the relevant trade corridors in the east.

Sixteen eastern ports are included in the study region, i.e., the U.S.-Canada border from Sault Ste. Marie to Calais. These ports have been grouped into border regions or frontiers in the following fashion, listed in order of the volume of trade.

1. The Michigan ports of Sault Ste. Marie, Port Huron, and Detroit compose the Michigan frontier.

2. The Niagara crossings are classified as the Niagara frontier.

3. Montreal South frontier is composed of Champlain-Rouses Point, Highgate Springs, Derby Line and Norton.

4. The Eastern New York frontier comprises the ports of Alexandria Bay, Ogdensburg, Massena, and Chateaugay-Trout River.

5. The Maine ports of Jackman, Madawaska, Houlton, and Calais are grouped together as the Maine frontier.

3.4.1 Agricultural Trade

Exports and imports of agricultural commodities, including foodstuffs, are shown in Table 3-27. In terms of exports, the Michigan frontier is the major gateway to Canada of agricultural goods from the Mid-West. In terms of imports, the Maine frontier ranks quite high based on the amount of imports from the Maritimes, a large portion of which is sea foods. This is the major import group for the Maine frontier.

TABLE 3-27. 1992 AGRICULTURAL TRADE BY BORDER REGION
($millions)

FRONTIER	EXPORTS	IMPORTS
Michigan	2,020	1,000
Niagara	950	822
Montreal South	525	524
Eastern New York	189	156
Maine	143	817
TOTAL	3,829	3,321

3.4.2 Minerals and Metals

The U.S. imports about twice the value of minerals and metals as it exports through the eastern frontiers as shown in Table 3-28.. The volumes are generally in line with the rank of the frontiers except that the Eastern New York frontier imports a disproportionate amount of this commodity group. This is the major import group for Eastern New York.

TABLE 3-28. 1992 MINERALS AND METALS TRADE BY BORDER REGION
($millions)

FRONTIER	EXPORTS	IMPORTS
Michigan	2,475	4,068
Niagara	1,350	2,823
Montreal South	404	1,039
Eastern New York	539	1,417
Maine	79	165
TOTAL	4,849	9,514

3.4.3 Chemicals and Plastics

Each of the border frontiers runs a positive trade balance with Canada in chemicals and plastics, except for Maine. The distribution of exports and imports, Table 3-29, is consistent with the ranking of the frontiers.

TABLE 3-29. 1992 CHEMICALS AND PLASTICS TRADE BY BORDER REGION
($millions)

FRONTIER	EXPORTS	IMPORTS
Michigan	3,646	2,525
Niagara	2,659	1,278
Montreal South	811	558
Eastern New York	443	349
Maine	100	226
TOTAL	7,662	4,937

3.4.4 Wood/Paper/Pulp

The U.S. is a net importer of wood/paper/pulp through each of the frontiers. The distributions are generally consistent with the rank of the frontiers except a higher ratio of this commodity is imported through the Montreal South gateways. Exports and imports of wood/paper/pulp are shown in Table 3-30.

TABLE 3-30. 1992 WOOD/PAPER/PULP TRADE BY BORDER REGION
($millions)

FRONTIER	EXPORTS	IMPORTS
Michigan	1,376	2,663
Niagara	1,110	1,346
Montreal South	374	1,838
Eastern New York	287	868
Maine	168	499
TOTAL	3,318	7,215

3.4.5 Machinery and Appliances

This commodity group represents the second largest two way trade flow between the two countries. The flows are between the manufacturing centers of the Mid-West and Mid-Atlantic, and Ontario and Quebec, as indicated in Table 3-31. The Montreal South crossings handle a relatively large portion of this trade. This is the major commodity group for the Montreal South frontier.

TABLE 3-31. 1992 MACHINERY AND APPLIANCE TRADE BY BORDER REGION
($millions)

FRONTIER	EXPORTS	IMPORTS
Michigan	9,681	3,445
Niagara	5,413	2,657
Montreal South	4,254	3,335
Eastern New York	609	296
Maine	208	40
TOTAL	20,167	9,775

3.4.6 Vehicles

This is the dominant commodity flow between the U.S. and Canada, as shown in Table 3-32. To a great extent it represents an integrated economy with parts and vehicles flowing between automobile plants on either side of the border. Previous to the FTA, tariff agreements were reached that eliminated trade restrictions and encouraged the continued development of a binational industry.

TABLE 3-32. 1992 VEHICLES TRADE BY BORDER REGION
($millions)

FRONTIER	EXPORTS	IMPORTS
Michigan	11,439	13,833
Niagara	4,405	8,347
Montreal South	999	815
Eastern New York	622	1010
Maine	331	25
TOTAL	17,797	24,032

3.4.7 Miscellaneous

The distribution of flows through this basket category is consistent with the overall ranking of the frontiers, as shown in Table 3-33. This confirms in a crude fashion the appropriateness of the previous six commodity groups.

TABLE 3-33. 1992 MISCELLANEOUS TRADE BY BORDER REGION
($millions)

FRONTIER	EXPORTS	IMPORTS
Michigan	1,231	1,514
Niagara	1,307	1,346
Montreal South	759	1,056
Eastern New York	353	536
Maine	82	71
TOTAL	3,735	4,526

3.4.8 Border Frontier Summary

The Michigan border is the largest gateway for all commodity groups, but the manufactured groups are most important. The trade is generally balanced, with exports and imports in each commodity group of the same order of magnitude.

The Niagara frontier is generally the second largest gateway for the various commodity groups, like Michigan, manufactured commodities are dominant and the trade is usually fairly balanced.

Montreal South is an important gateway into the U.S. for Canadian minerals and metals and wood/paper/pulp, although two-way traffic is dominated by the flows of machinery and appliances.

The Eastern New York frontier is an important gateway to the U.S. for minerals and metals and, to a lesser extent, wood/paper/pulp.

The Maine border is primarily a gateway to the U.S. for non-manufactured commodities, especially agricultural (and foodstuffs.) It is a minor export gateway for manufactured commodities.

3.5 PORT SPECIFIC TRADE FLOWS

The broad gateways described above serve different types of markets as can be seen from the commodity discussion. They also serve quite different geographic areas. The trade flows using the individual ports will be discussed in this section.

One of the primary requirements for this study is the identification of existing trade corridors. The corridor concept has some intuitive appeal but, in practice, is difficult to define in regions having mature transportation networks. As was noted in the discussion of infrastructure needs, the primary transportation requirements for most crossings are better access to the national networks rather than the development of particular 'corridors.'

Nonetheless, the trade between Canada and the U.S. was evaluated for corridors by allowing the patterns of the trade origins and destinations to point to existing corridors. Three general trade patterns were identified. The most common pattern is intra-regional trade, for which commodities move among contiguous states in the border regions. These movements require strong regional transportation networks with good access to and from the crossings.

The second type of trading pattern was inter-regional, for which trade originates in or is destined to states far removed from the border. The best common examples are flows to California and Texas. This type of trade is best served by a strong line haul transportation system. Local border crossing access should be relatively less important to these flows.

The third type of trade flow probably most closely matches the intuitive understanding of trade corridors. This is trade for which the imports or exports move deep in to the nation, but unlike the interregional flows, there are flows to and from the intervening states or provinces. This pattern will be referred to as extended regional flows. For this type of flow pattern, having multiple parallel line haul links may provide more effective transportation service to the states and provinces involved.

In order to observe the particular pattern of trade for each port, the top ten origin-destination (o/d) pairs, based on total value of the flows without regard to commodity, were identified and the summarized. Since data are lacking on the true destination of exports to Canada, this approach resulted in identifying the top ten states exporting through the particular crossing. For imports, it is possible and likely that the top ten o/d pairs would include flows from one province to several different states or from several different provinces to a single state. As a result the top ten o/d pairs will not yield ten states or provinces.

Selecting the top ten o/d flows was arbitrary but effective. In general, these ten o/d pairs account for more than 70 percent of all trade through a crossing. This is because the distribution of origins or destinations follows the patterns seen before, such as those in Tables 3-16 and 3-17. When the coverage falls below 70 percent, it is typically a result of having a large percent of the crossings trade lacking a specified origin or destination. Trade flows for which the origin or destination is unknown were deleted from the ranking but are included in the total trade passing through the crossing.

3.5.1 Ports in the Michigan Frontier[6]

3.5.1.1 Sault Ste. Marie - The top ten export and import flows account for approximately 80 percent of the trade through this crossing. The States and provinces involved with the trade are shown in Figures 3-5 for U.S. exports and 3-6 for imports. The trade is predominately intra-regional, however there is a fairly large trade flow to and from the northwest and Tennessee is the fourth largest destination state.

3.5.1.2 Port Huron - The top ten flows account for over 80 percent of the exports and approximately 70 percent of the imports. The pattern is basically intra-regional, with Michigan dominating the exports and Michigan, Illinois, and Ohio dominating the imports. There are reasonably large inter-regional flows to and from California and Texas. Alberta is the third largest origination province of shipments through these crossings with trade valued at about 10 percent of that of the largest province, Ontario. These patterns are shown in Figures 3-7 for U.S. exports and 3-8 for imports.

3.5.1.3 Detroit - The top ten flows account for about 80 percent of exports and 74 percent of imports. The patterns of trade are complex, as might be expected for the nation's major port. Most of the trade is intra-regional. However, there is significant interregional trade with California and, in terms of exports, Texas. There are also two extended regional flows; one to the west to Missouri and another to the southeast to Georgia. These can be seen in Figures 3-9 and 3-10.

In summary, the Michigan frontier primarily serves the U.S. and Canadian industrial core centered around Michigan. Inter-regionally, flows are mainly to California and Texas and secondarily to the northwest. Corridors of the extended regional type run to Missouri in the west and Georgia in the southeast.

3.5.2 The Buffalo-Niagara Frontier

The top ten o/d pairs account for 74 percent of exports and 76 percent of imports. The primary service area for these crossings is the eastern portion of the industrial Mid West and the Mid Atlantic states. There are inter-regional flows to and from California, although California exports through the port are only 3.4 percent of the total; to and from North Carolina, although North Carolina imports are only 2.2 percent of the port total; and from Alberta, which is the second largest originating province with 3.9 percent to the total port flow from Canada. These data are presented in Figures 3-11 and 3-12.

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[6]The supporting data for this discussion are in Appendices 1-5.

Figure 3-5. Major Origins and Destinations through Sault Ste. Marie, MI, 1992 US Exports, (in dollars)

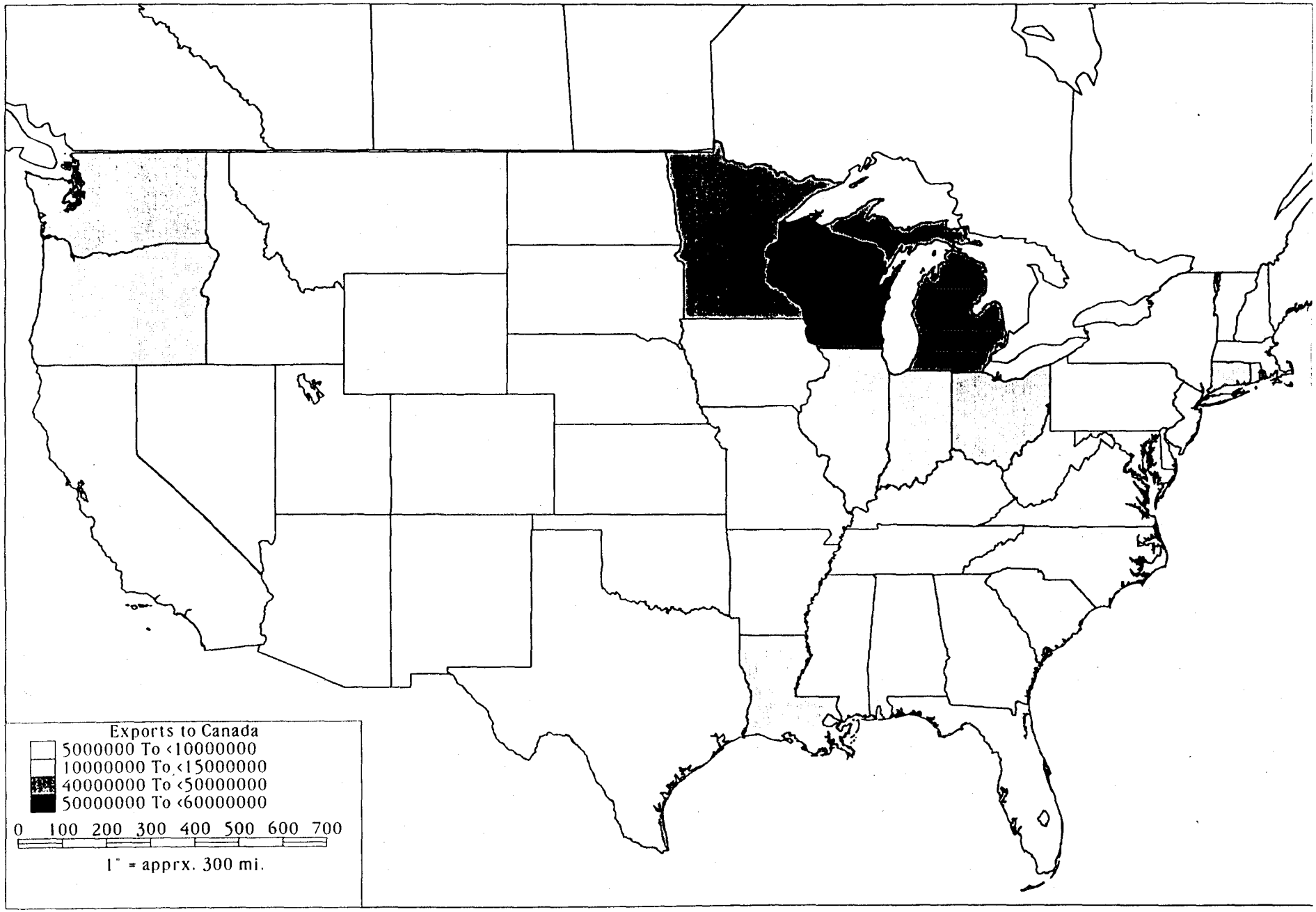


Figure 3-6. Major Origins and Destinations through Sault Ste. Marie, MI, 1992 US Imports, (in dollars)

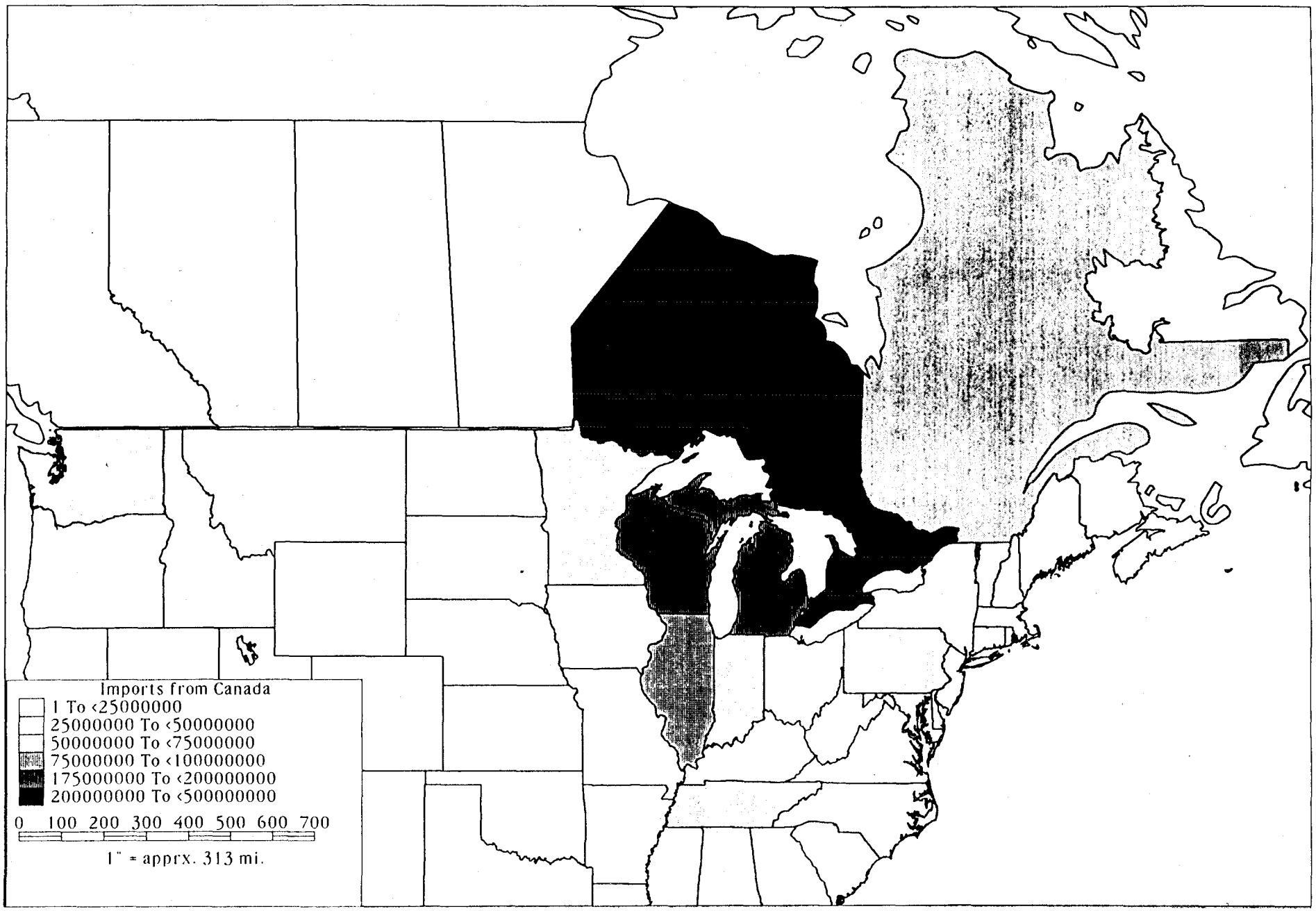


Figure 3-7. Major Origins and Destinations through Port Huron, MI, 1992 US Exports, (in dollars)

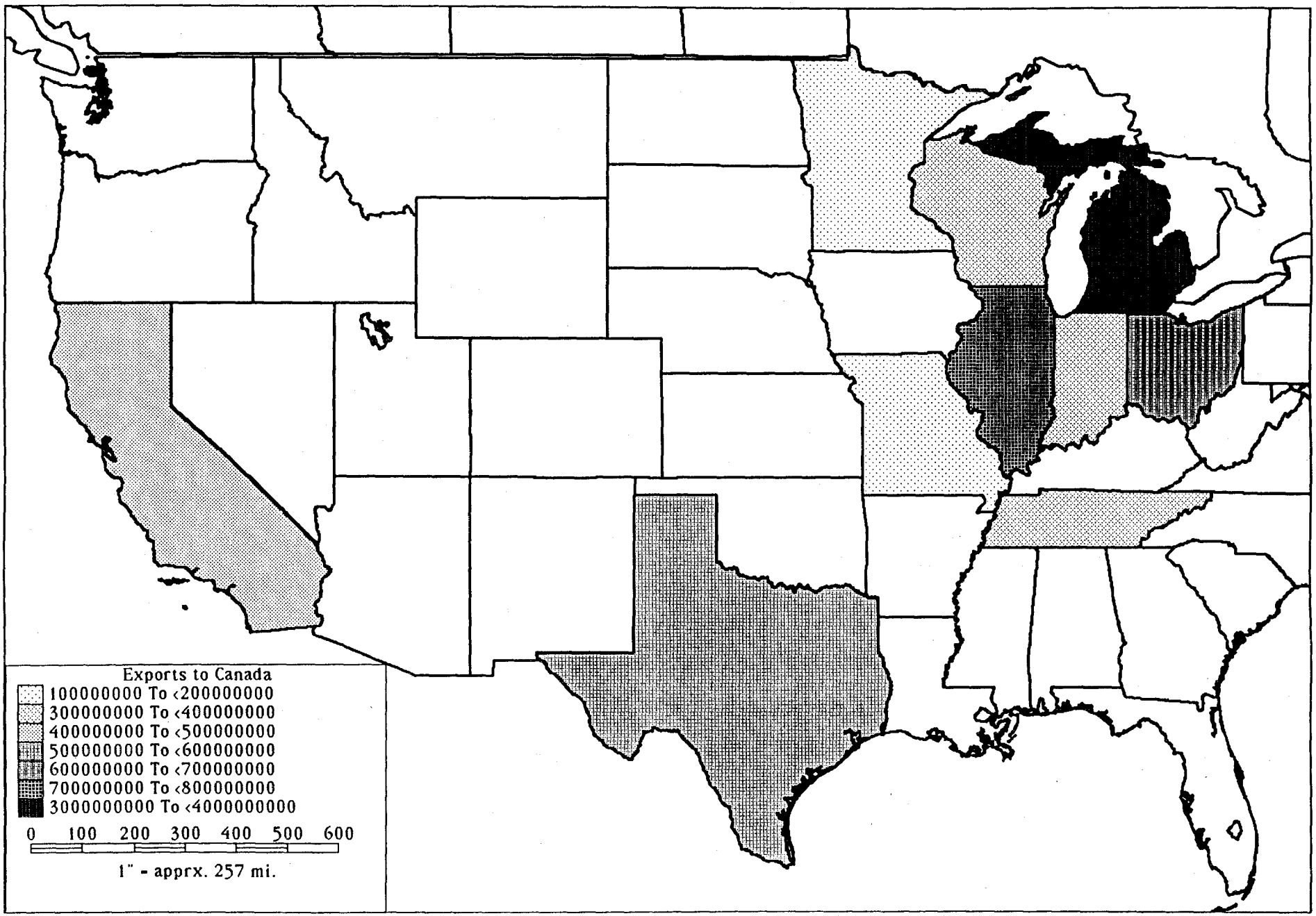


Figure 3-8. Major Origins and Destinations through Port Huron, MI, 1992 US Imports, (in dollars)

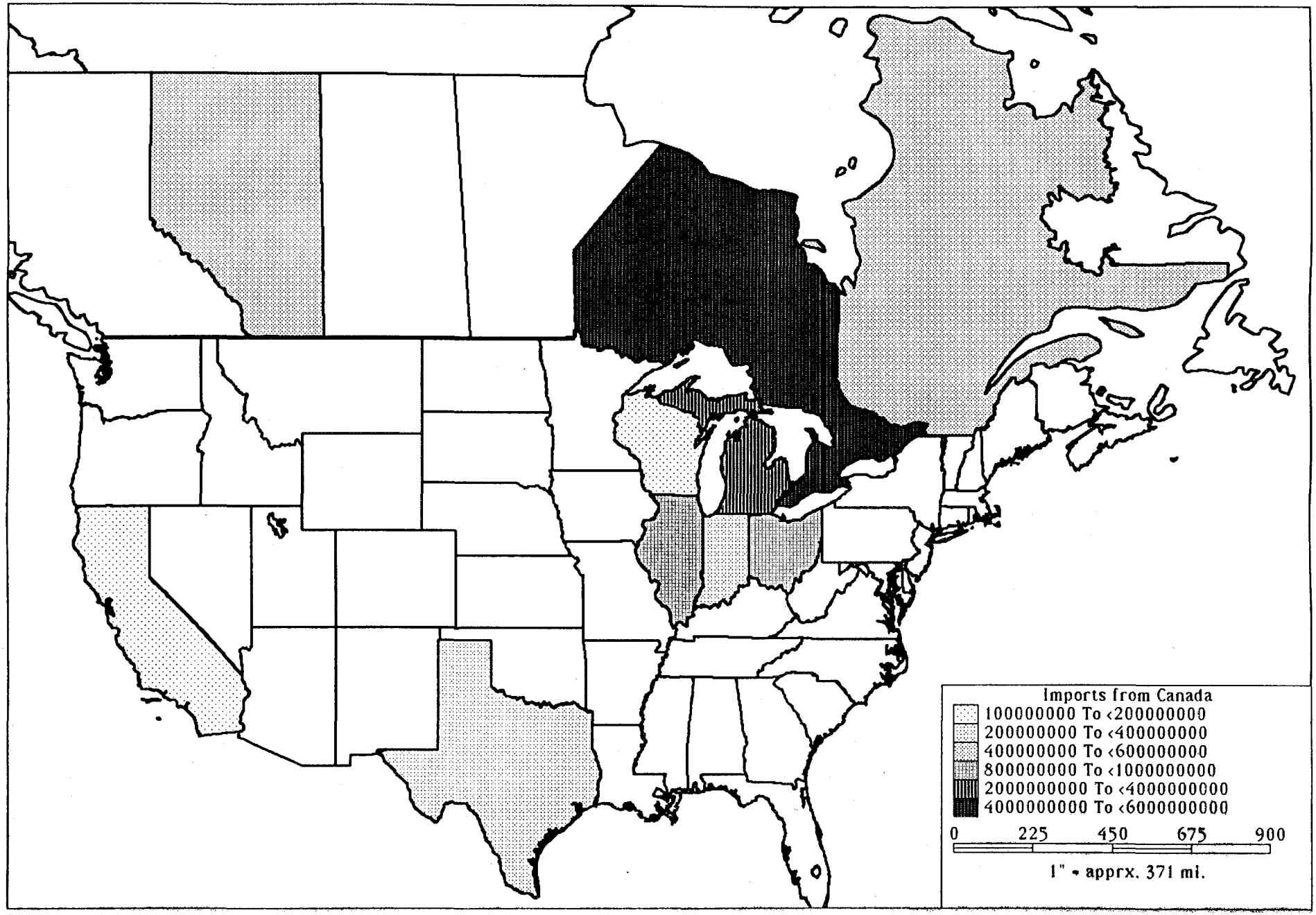


Figure 3-9. Major Origins and Destinations through Detroit, MI, 1992 US Exports, (in dollars)

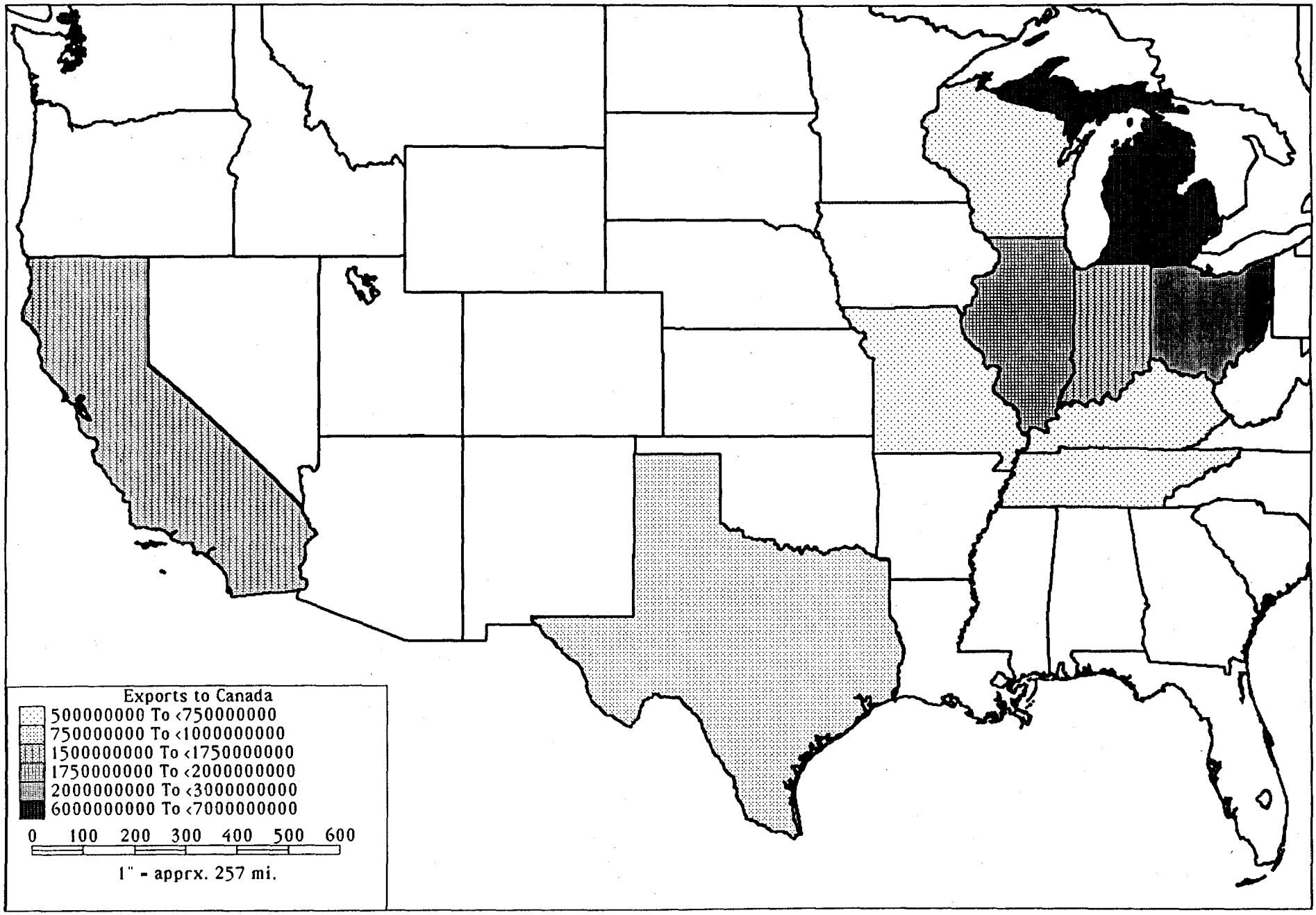


Figure 3-10. Major Origins and Destinations through Detroit, MI, 1992 US Imports, (in dollars)

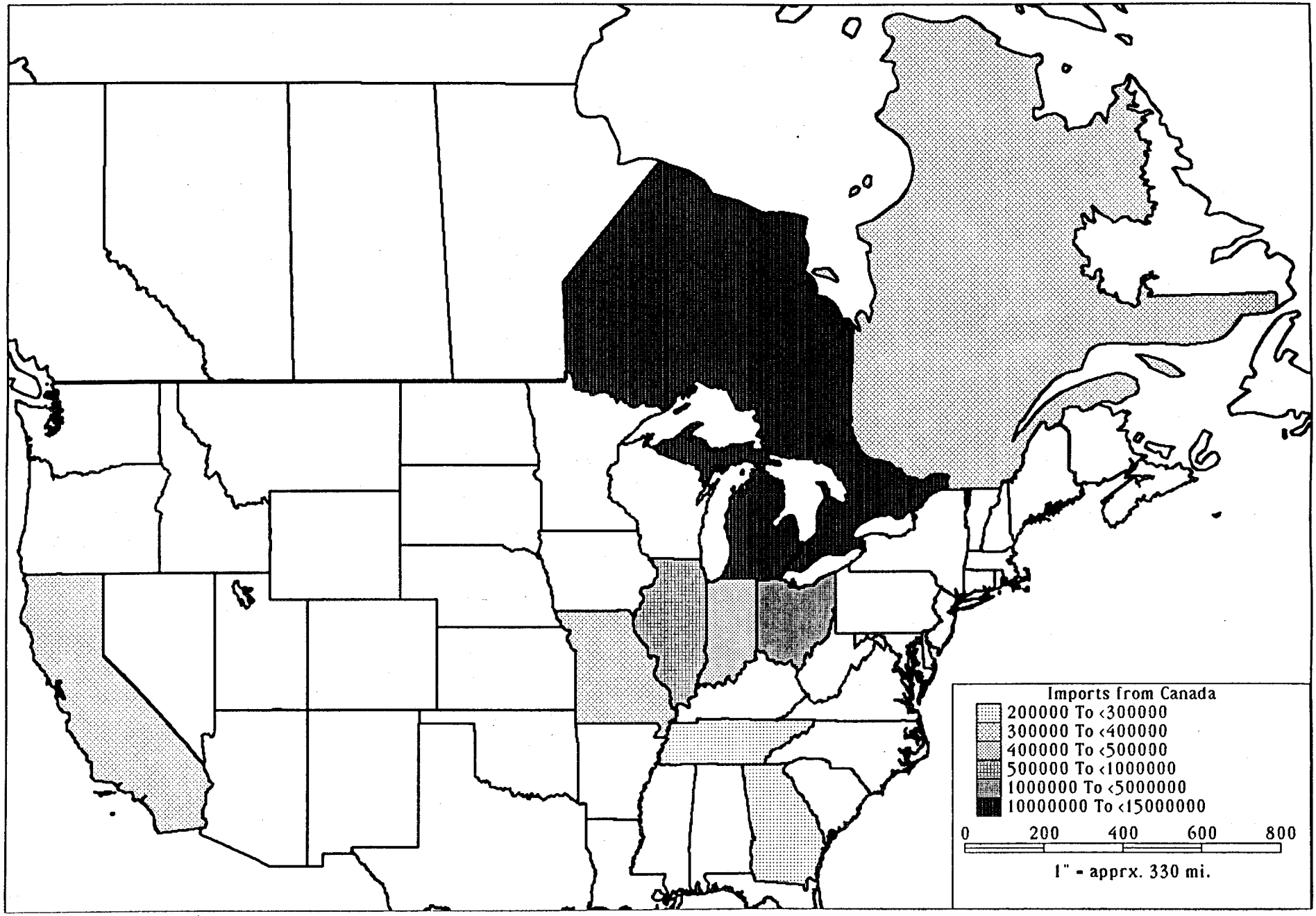


Figure 3-11. Major Origins and Destinations through Buffalo-Niagara, NY, 1992 US Exports, (in dollars)

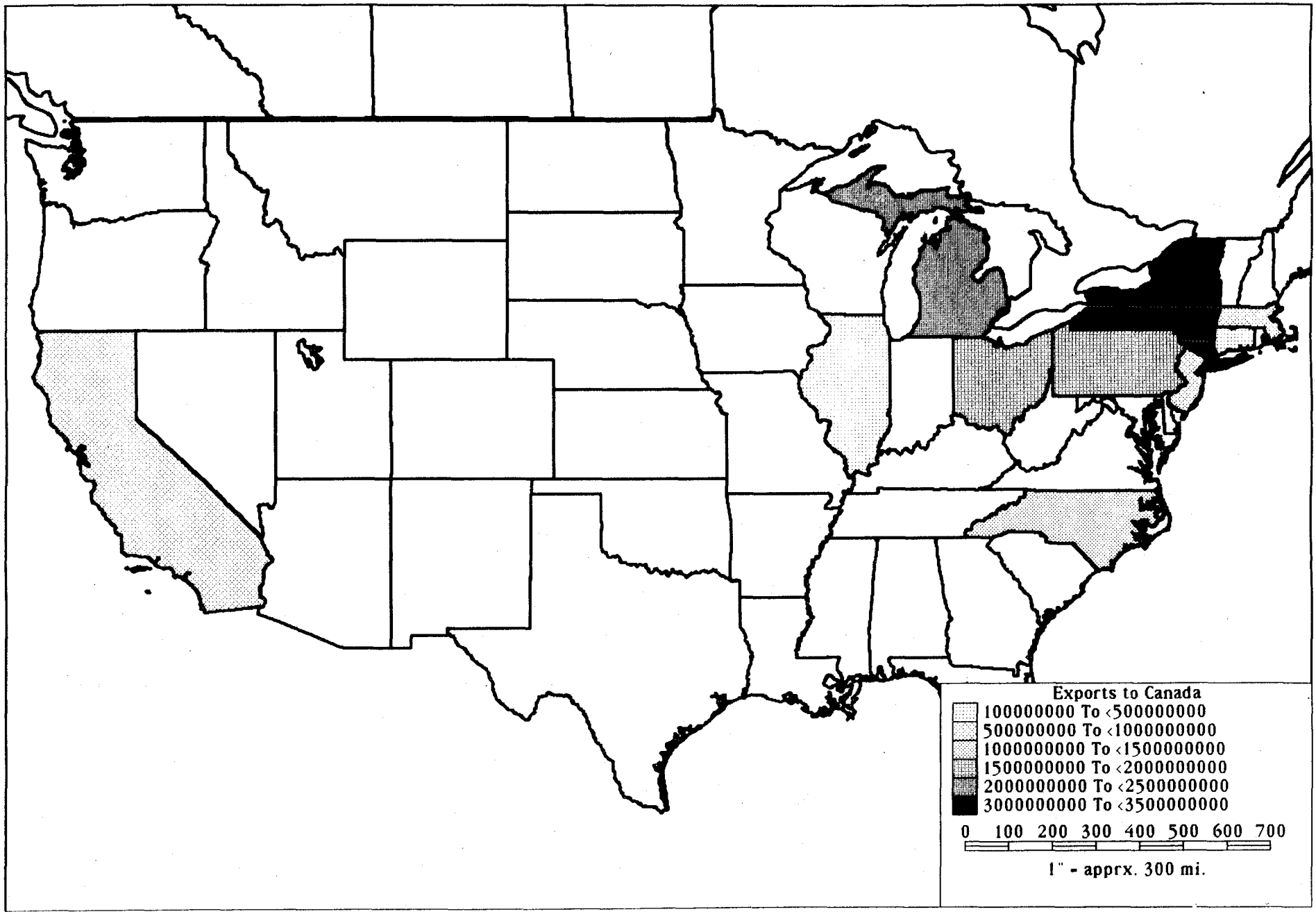
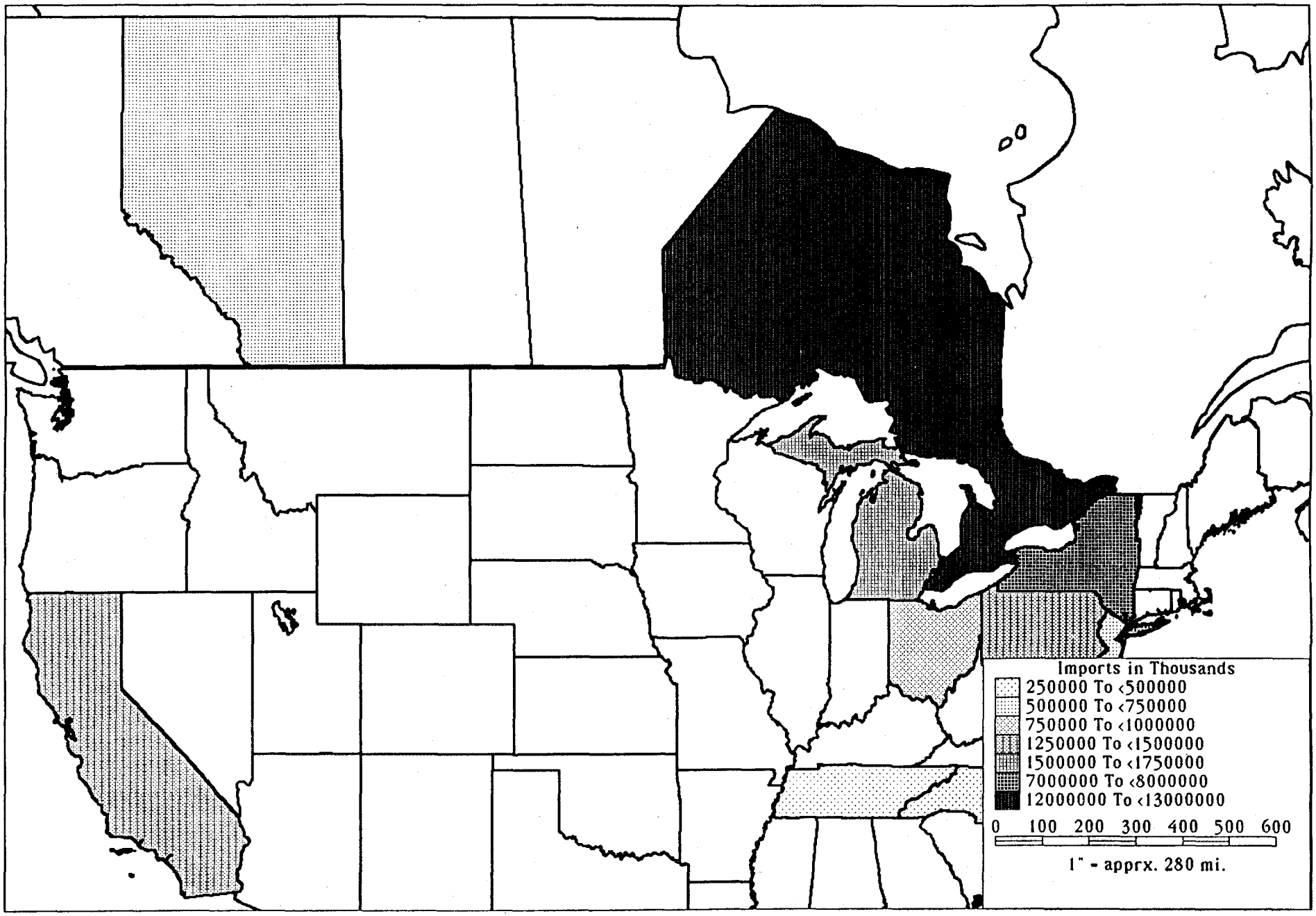


Figure 3-12. Major Origins and Destinations through Buffalo-Niagara, NY, 1992 US Imports, (in thousands of dollars)



3.5.3 Ports in the Eastern New York Frontier

3.5.3.1 Alexandria Bay - The top ten o/d pairs for this crossing account for 71 percent of exports and 48 percent of imports (destination data were lacking for much of the imports through this port.) Most of the flows are intra-regional, focused heavily on the Mid-Atlantic-Ontario/Quebec region. There are some flows that extend further down the East Coast as far as South Carolina. This is shown in Figures 3-13 and 3-14.

3.5.3.2 Ogdensburg - The top ten o/d pairs account for 88 percent of exports and 89 percent of imports. With one major exception the service area of the Ogdensburg port is primarily local. New York alone receives 82 percent of all imports through this port. There is some trade within the wider region and some dispersed trade. Several southeastern states trade with Canada through this port, and California and Texas export though Ogdensburg. The major exception to the local nature of the Ogdensburg trade is that Alberta is the largest source of imports from Canada. The Ogdensburg flows are shown in Figures 3-15 and 3-16.

3.5.3.3 Massena - The top ten o/d pairs through Massena account for 58 percent of the exports and 65 percent of the imports. This port, like Ogdensburg, is primarily local service. The majority of the imports and exports are New York trade. The remaining trade is to the broader region, with minor flows inter-regionally. Export and import flows are shown in Figures 3-17 and 3-18.

3.5.3.4 Chateaugay-Trout River - This is a very small crossing with virtually no imports and very little export activity. The pattern of exports is shown in Figure 3-19.

In summary, the ports in this frontier primarily serve local activity. Only Alexandria Bay has any significant intra- or inter-regional trade flows. The interregional flows reach to the southeast.

3.5.4 Ports in the Montreal South Frontier

3.5.4.1 Champlain-Rouses Point - The top ten o/d pairs account for 67 percent of both exports and imports. This is one of the two major ports in the region. It primarily serves southern New England and the Mid-Atlantic states. However, there is a reasonable amount of trade activity with southeastern states. Figures 3-20 and 3-21 contain the trade flows data for this port.

3.5.4.2 Highgate Springs - The top ten o/d pairs account for 95 percent of exports and 80 percent of imports. This is the second major port in the frontier. Its location places it at a disadvantage for long distance trade when compared to Champlain-Rouses Point. As a result, it serves Vermont and secondarily New England and the Mid-Atlantic states. These patterns are shown in Figures 3-22 and 3-23.

3.5.4.3 Derby Line - The top ten o/d pairs account for 81 percent of exports and 73 percent of imports. This is a relatively low volume intra-regional port with relatively little local trade. New England and Quebec are served through this port, although there is some inter-regional trade with Michigan. Figures 3-24 and 3-25 contain data for Derby Line.

Figure 3-13. Major Origins and Destinations through Alexandria Bay, NY, 1992 US Exports, (in dollars)

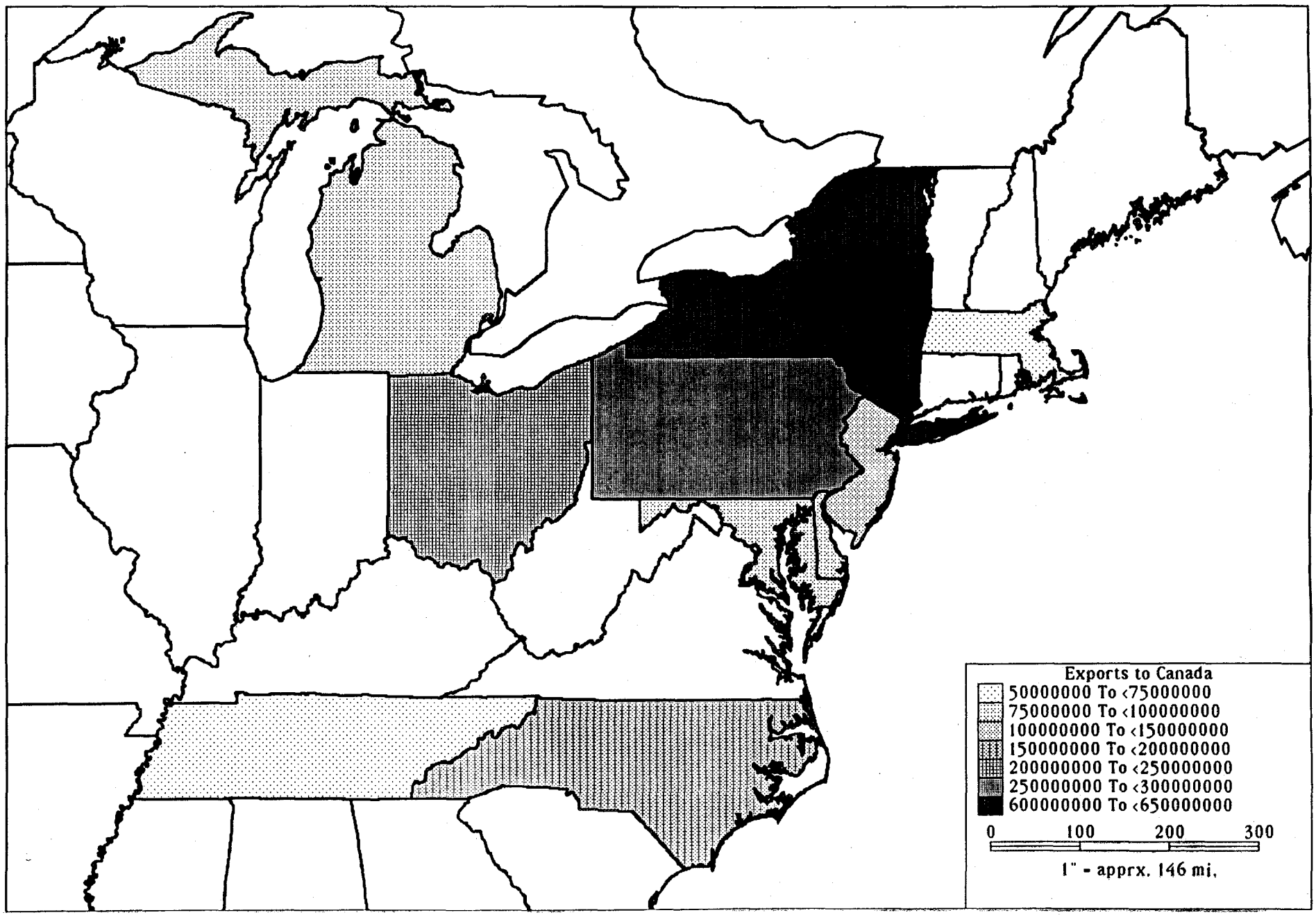


Figure 3-14. Major Origins and Destinations through Alexandria Bay, NY, 1992 US Imports, (in dollars)

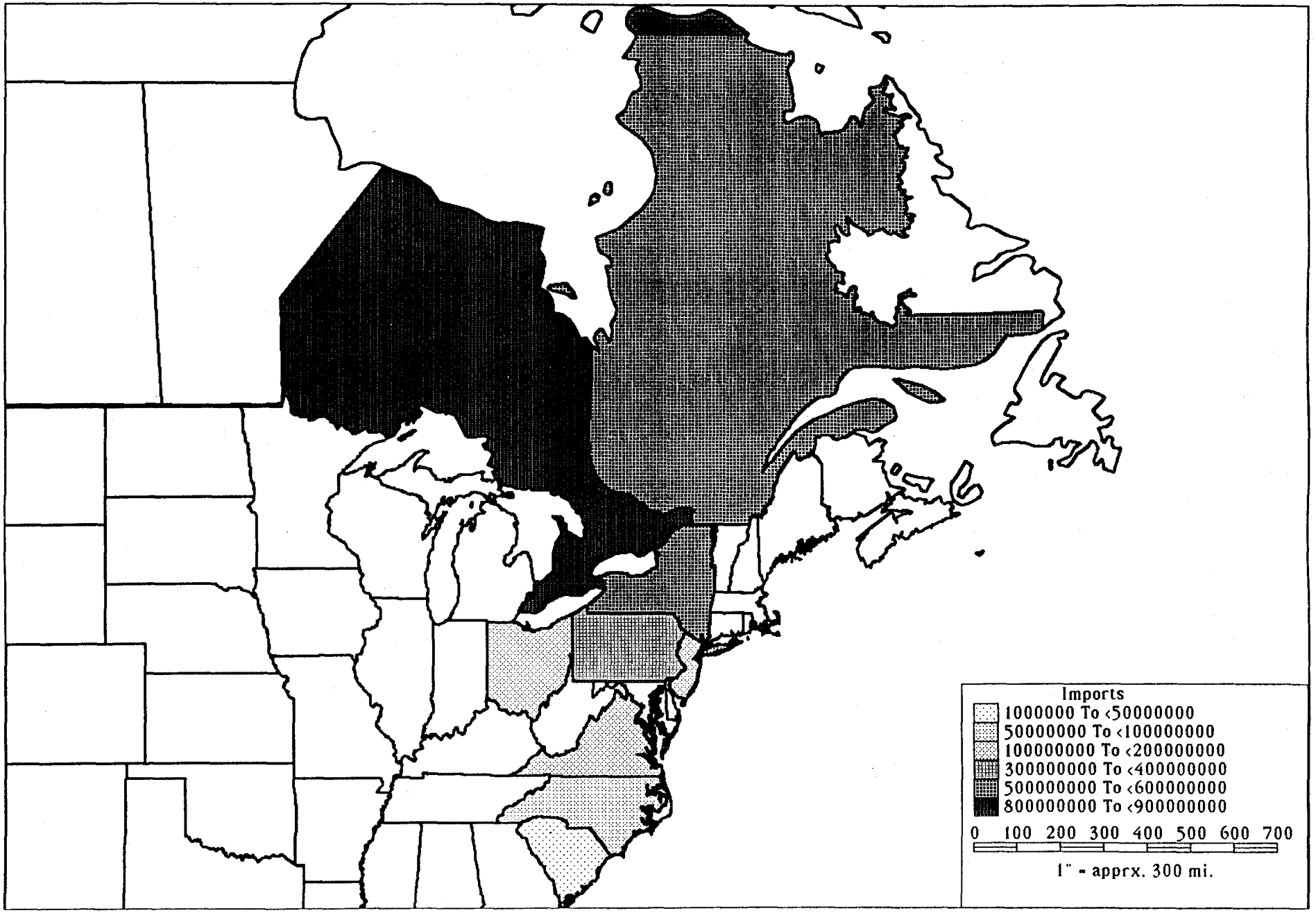


Figure 3-15. Major Origins and Destinations through Ogdensburg, NY, 1992 US Exports, (in dollars)

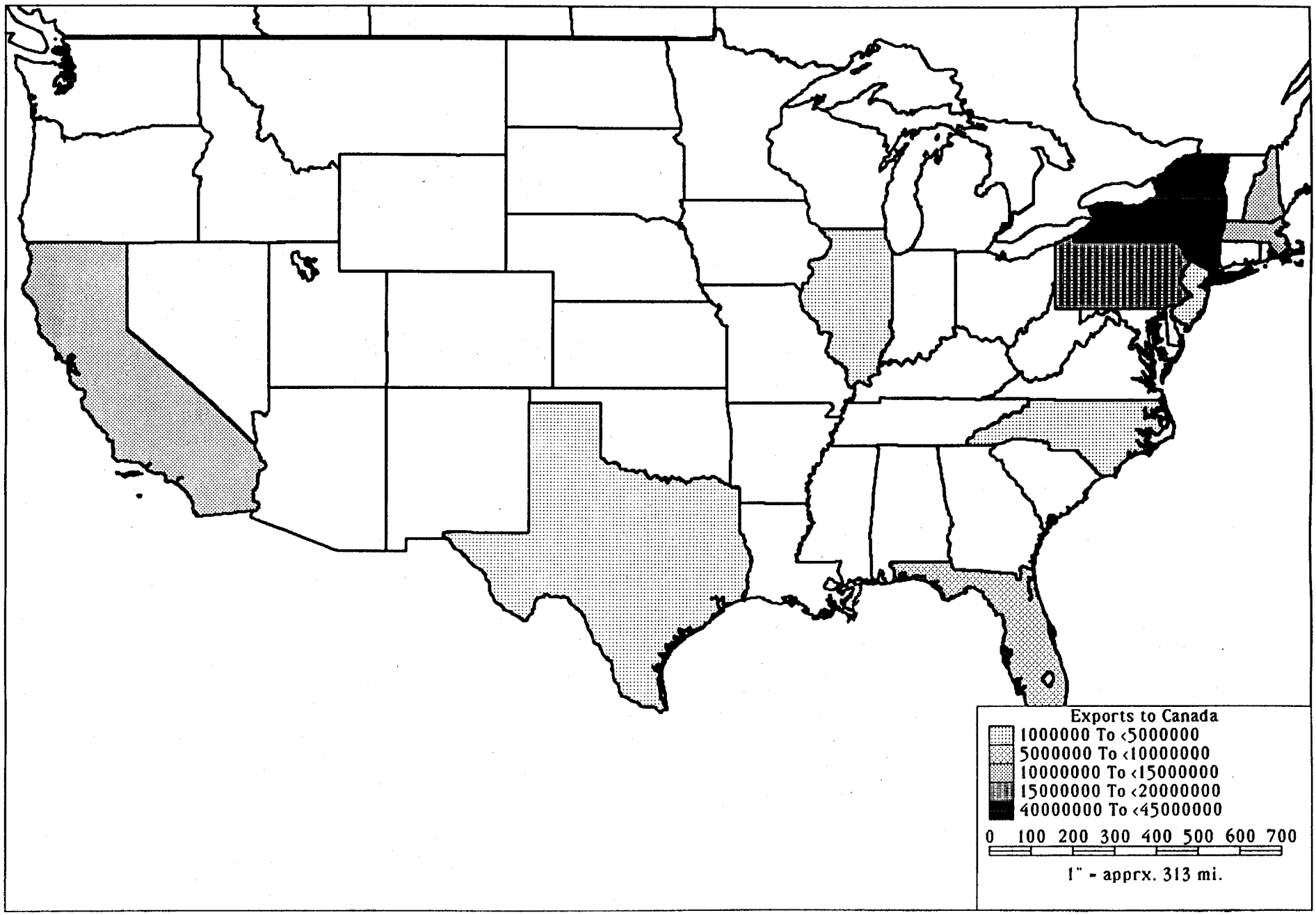


Figure 3-16. Major Origins and Destinations through Ogdensburg, NY, 1992 US Imports, (in dollars)

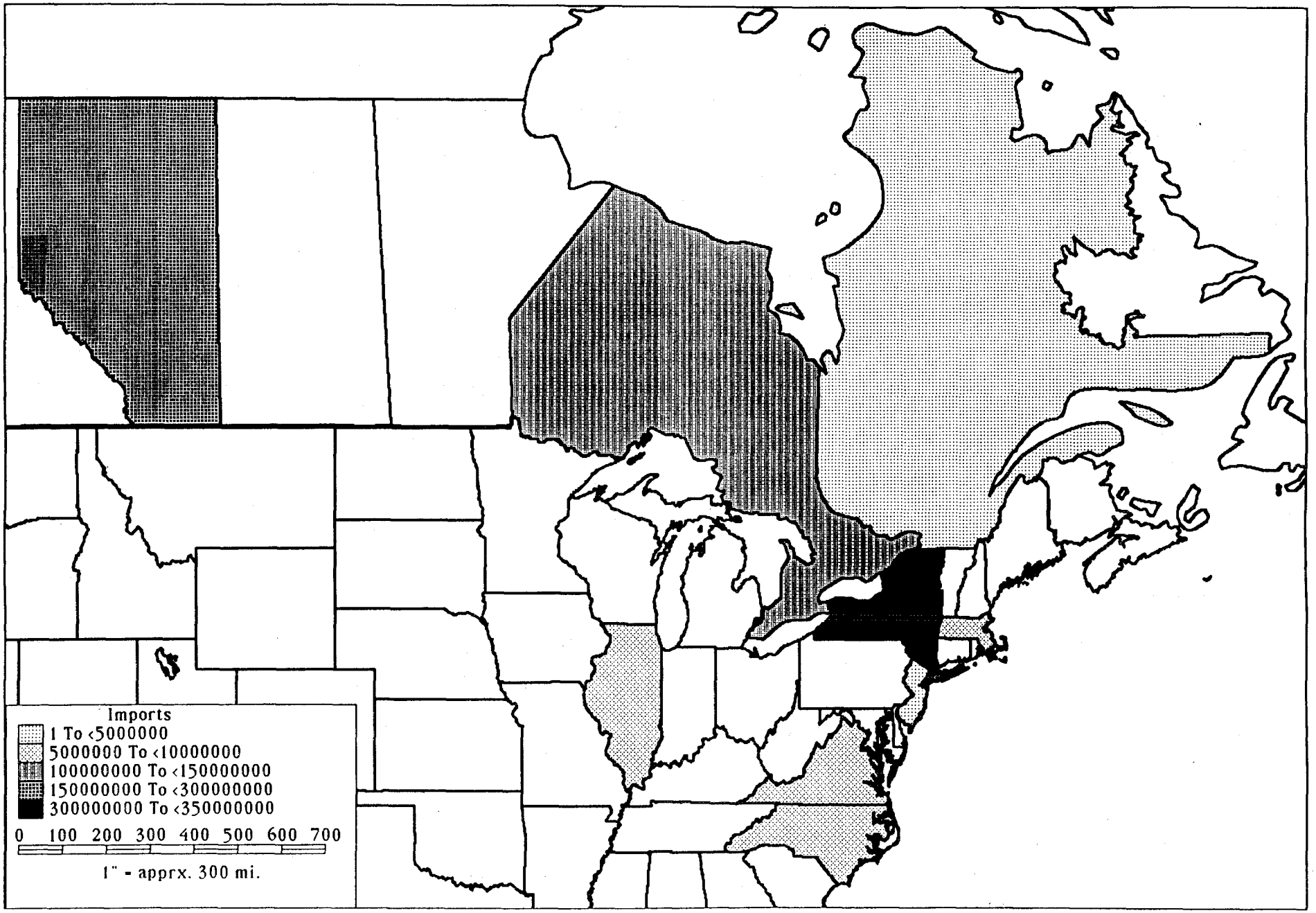


Figure 3-17. Major Origins and Destinations through Massena, NY, 1992 US Exports, (in dollars)

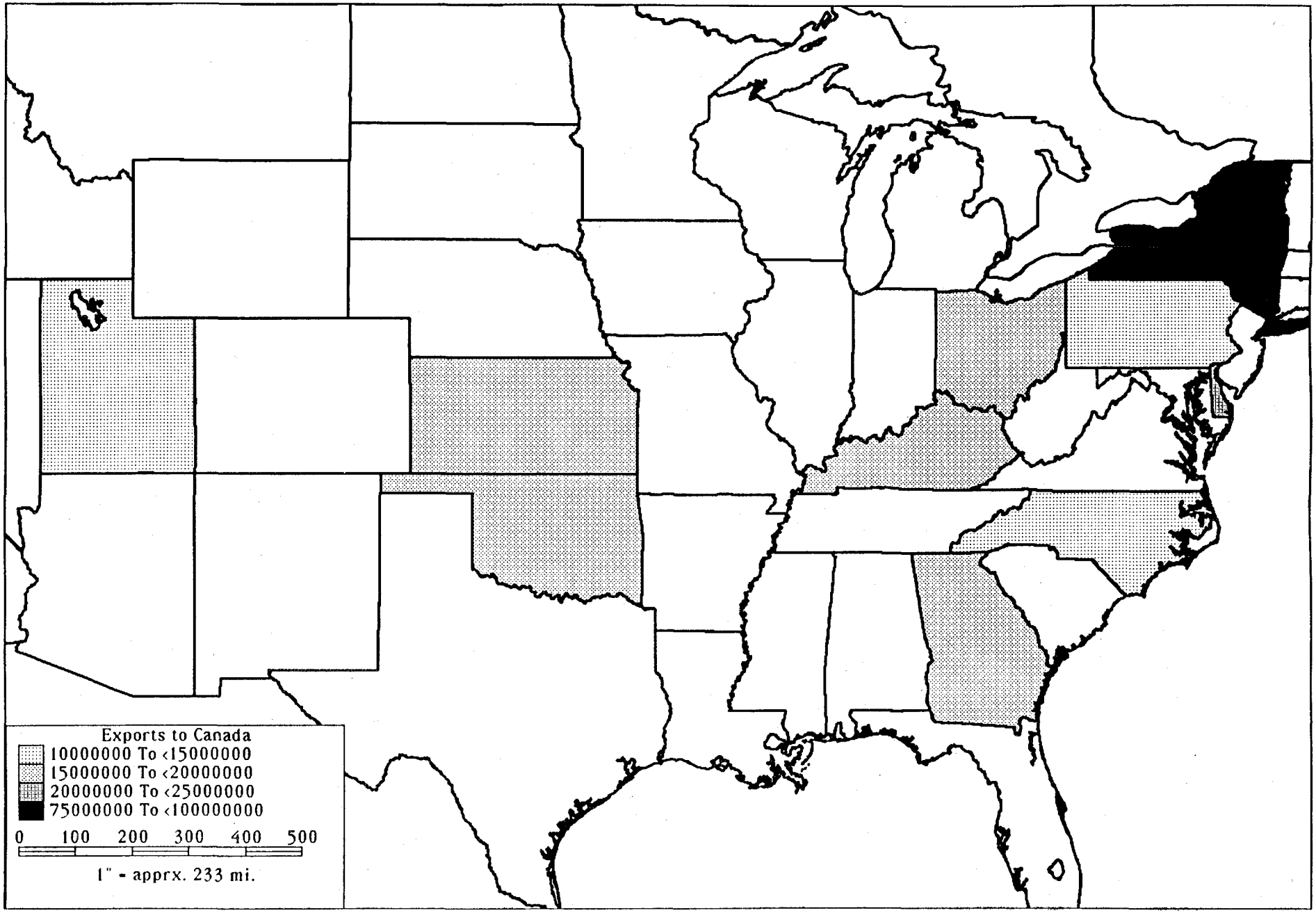


Figure 3-18. Major Origins and Destinations through Massena, NY, 1992 US Imports, (in dollars)

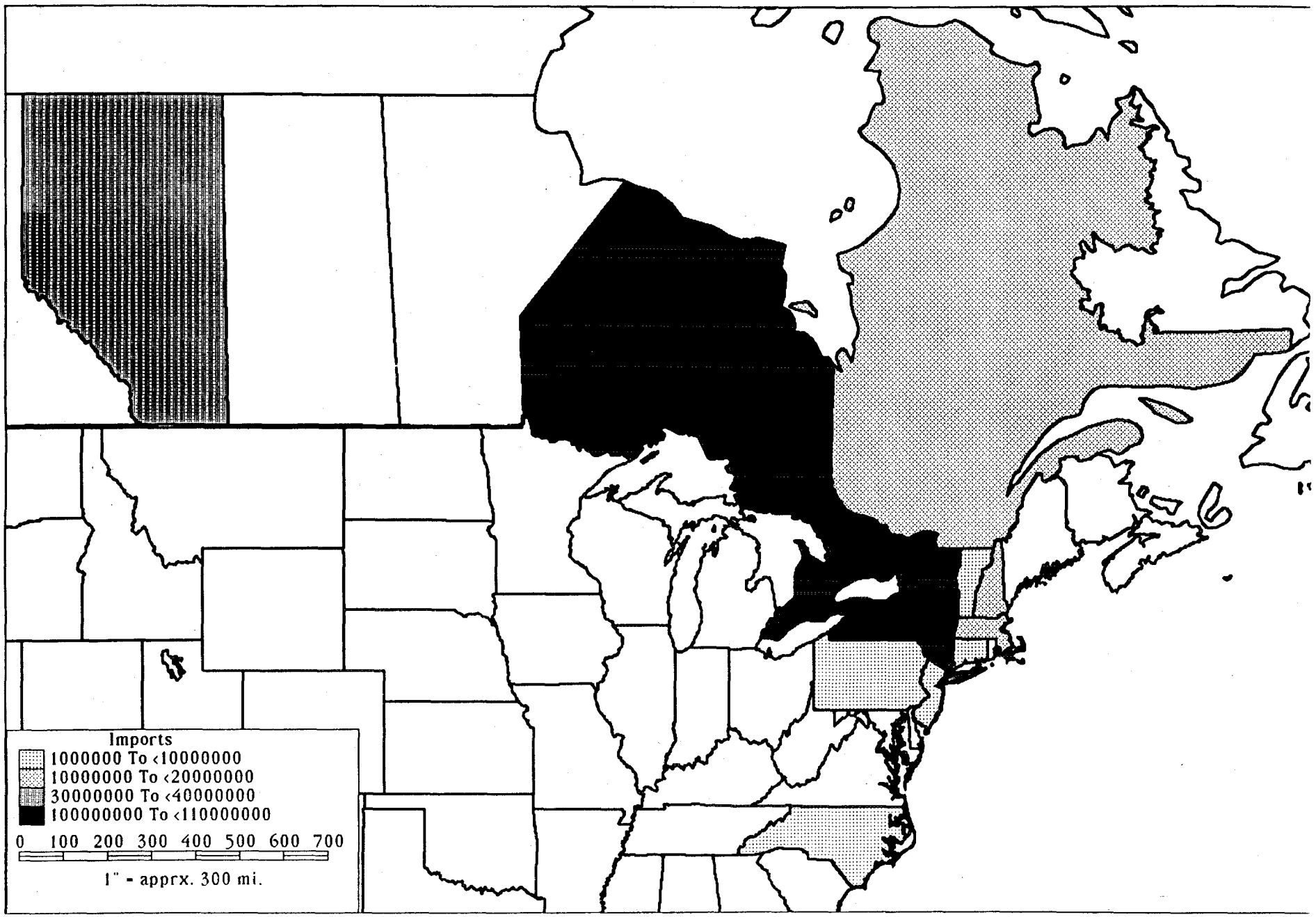


Figure 3-19. Major Origins and Destinations through Chateaugay, NY, 1992 US Exports, (in dollars)

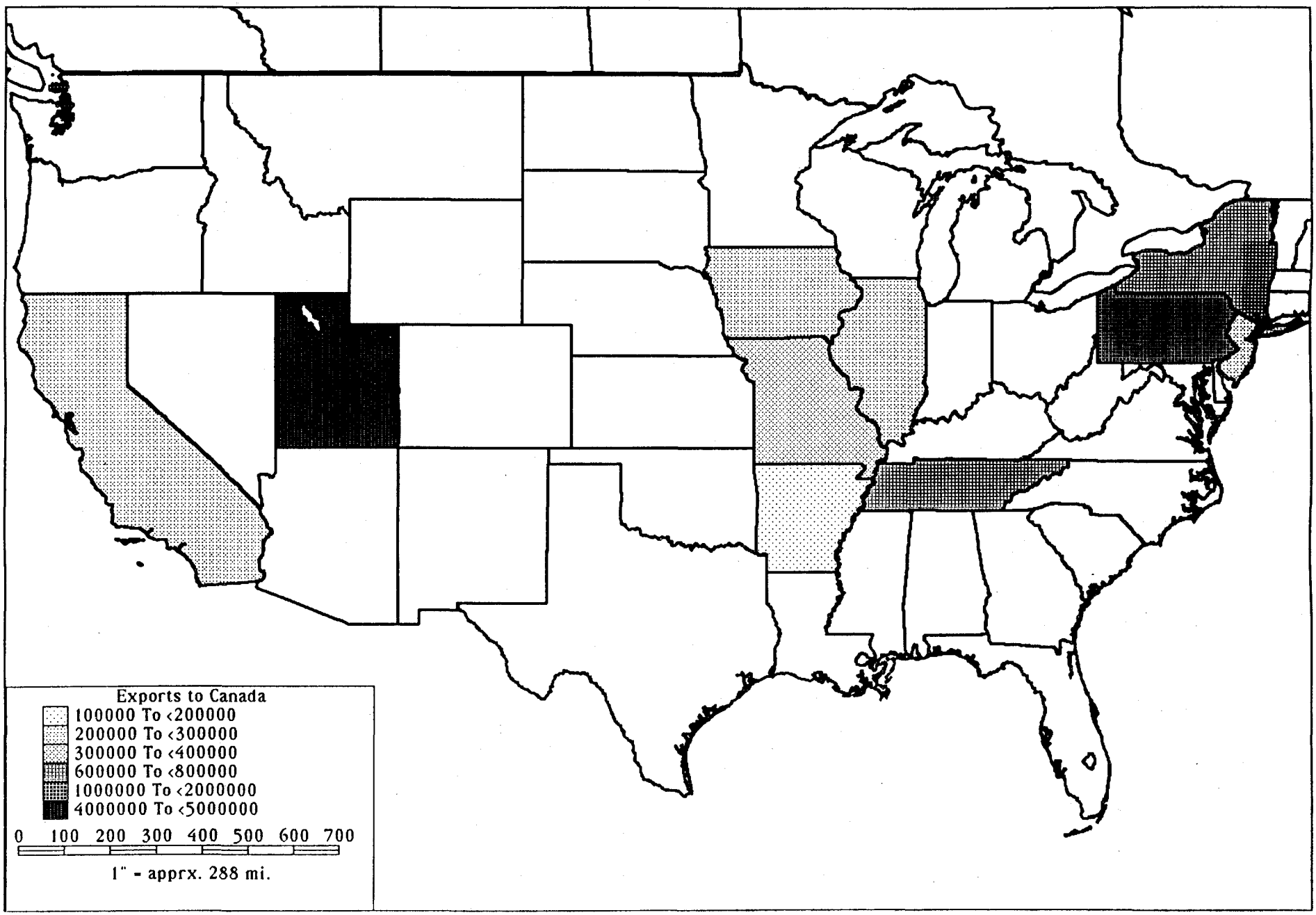


Figure 3-20. Major Origins and Destinations through Champlain, NY, 1992 US Exports, (in dollars)

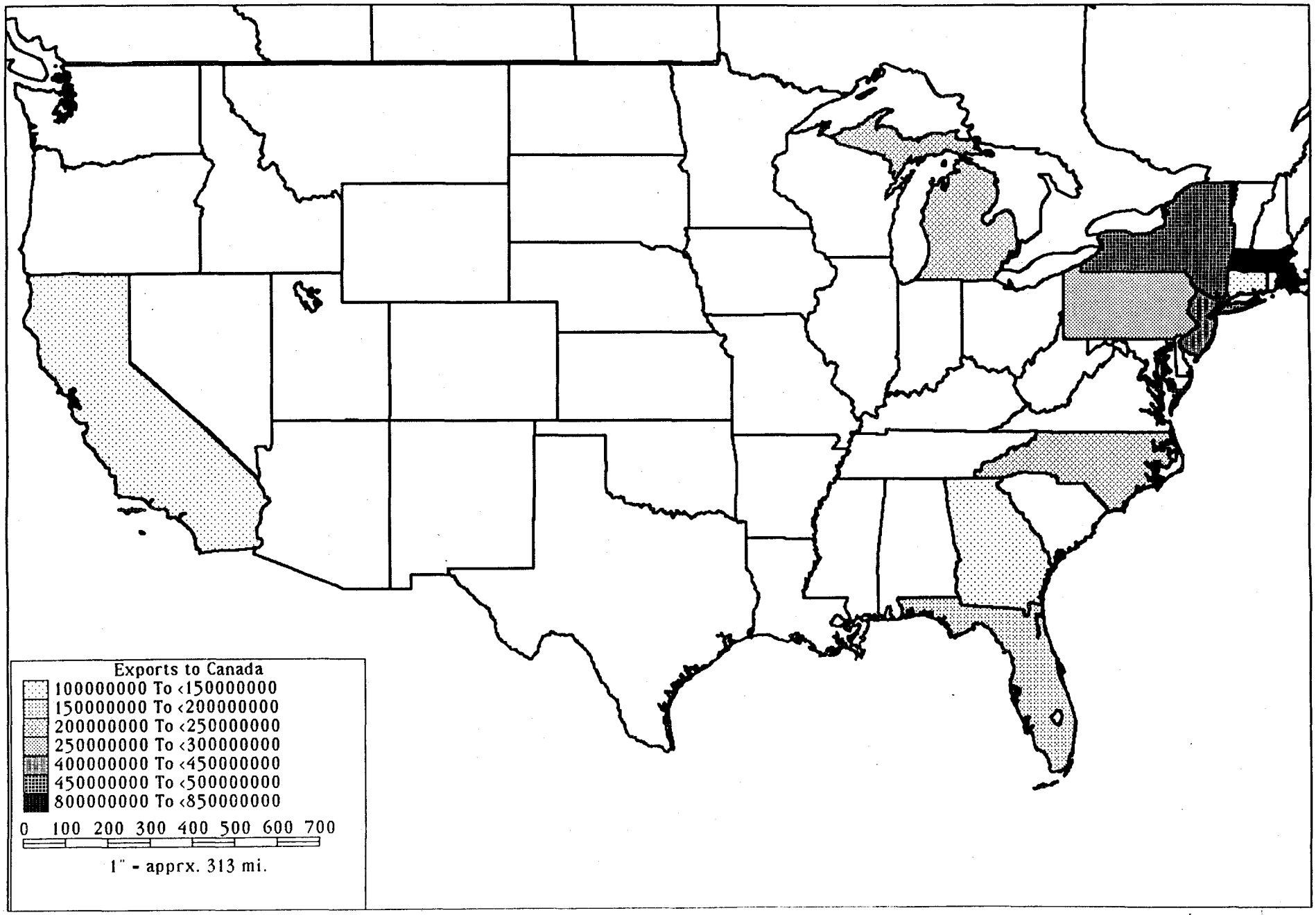


Figure 3-21. Major Origins and Destinations through Champlain, NY, 1992 US Imports, (in dollars)

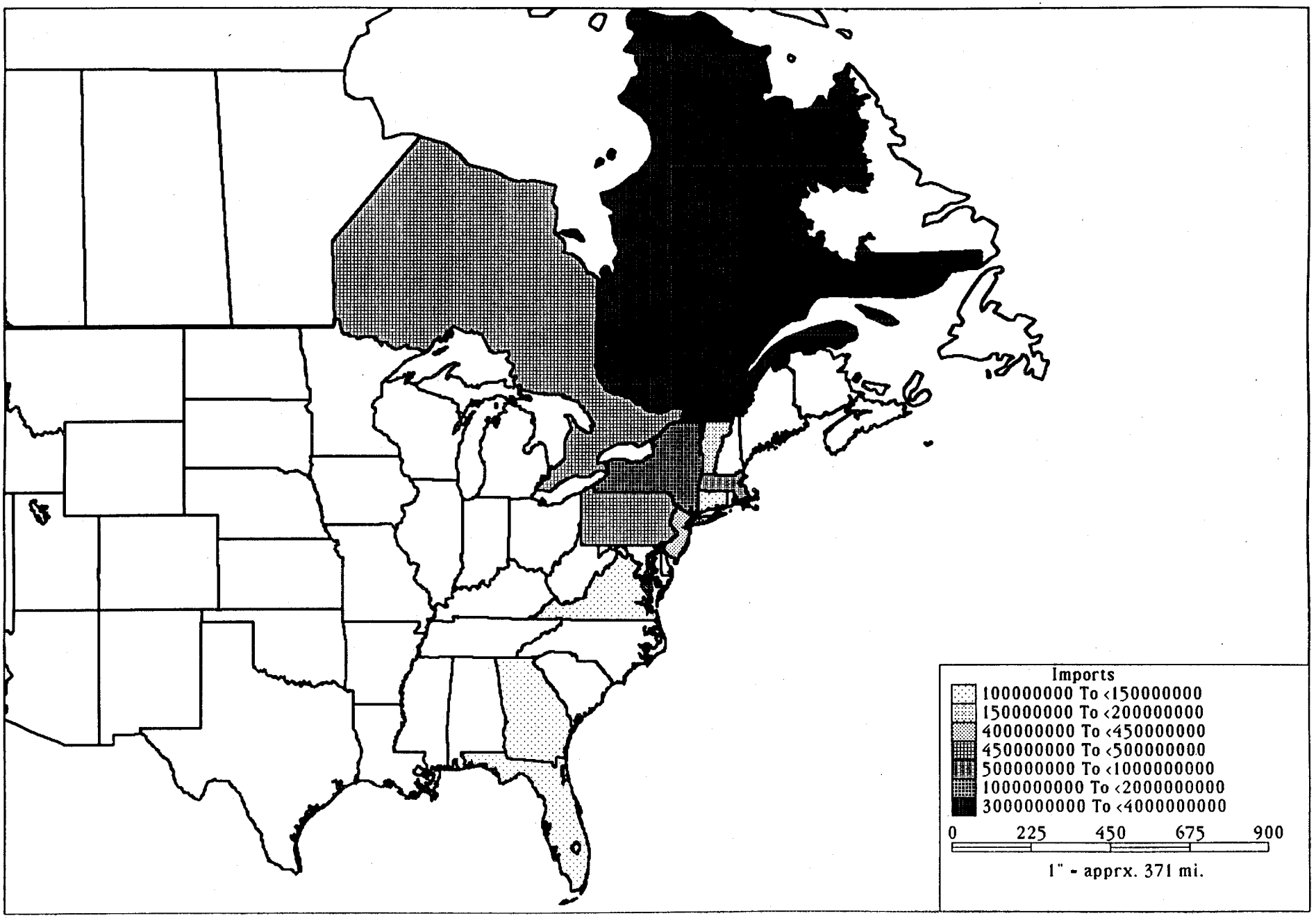


Figure 3-22. Major Origins and Destinations through Highgate Springs, VT, 1992 US Exports, (in dollars)

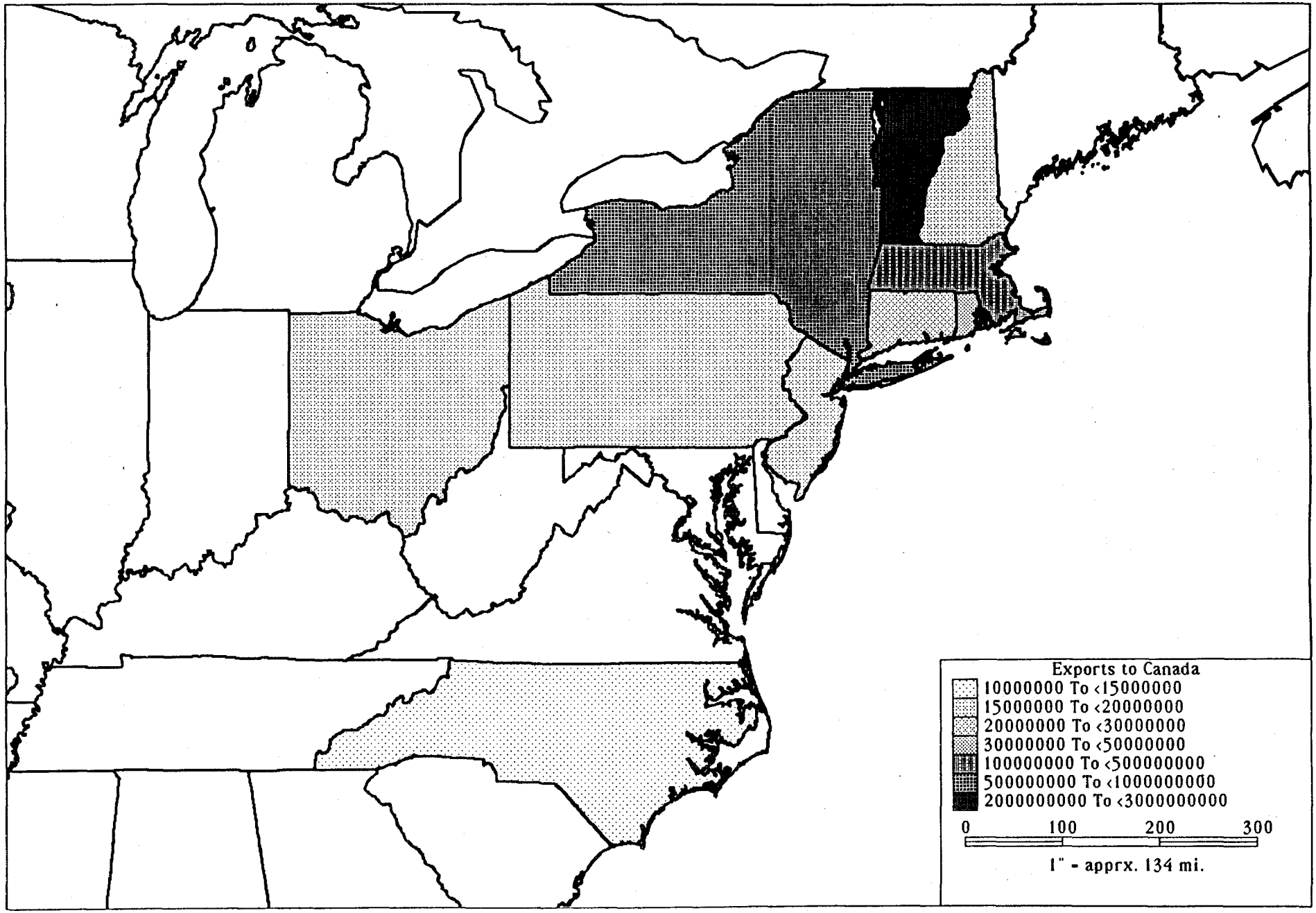


Figure 3-23. Major Origins and Destinations through Highgate Springs, VT, 1992 US Imports, (in dollars)

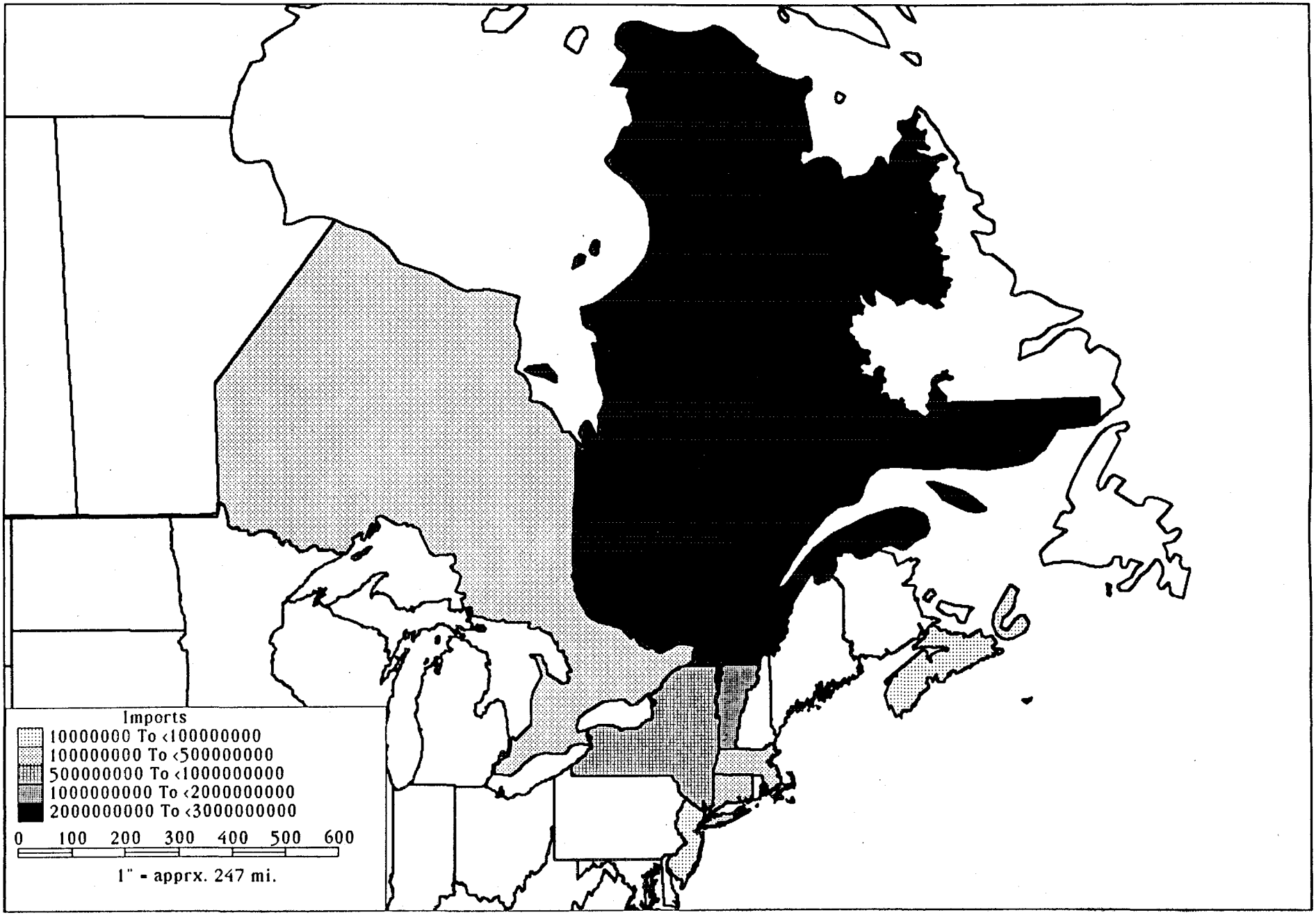


Figure 3-24. Major Origins and Destinations through Derby Line, VT, 1992 US Exports, (in dollars)

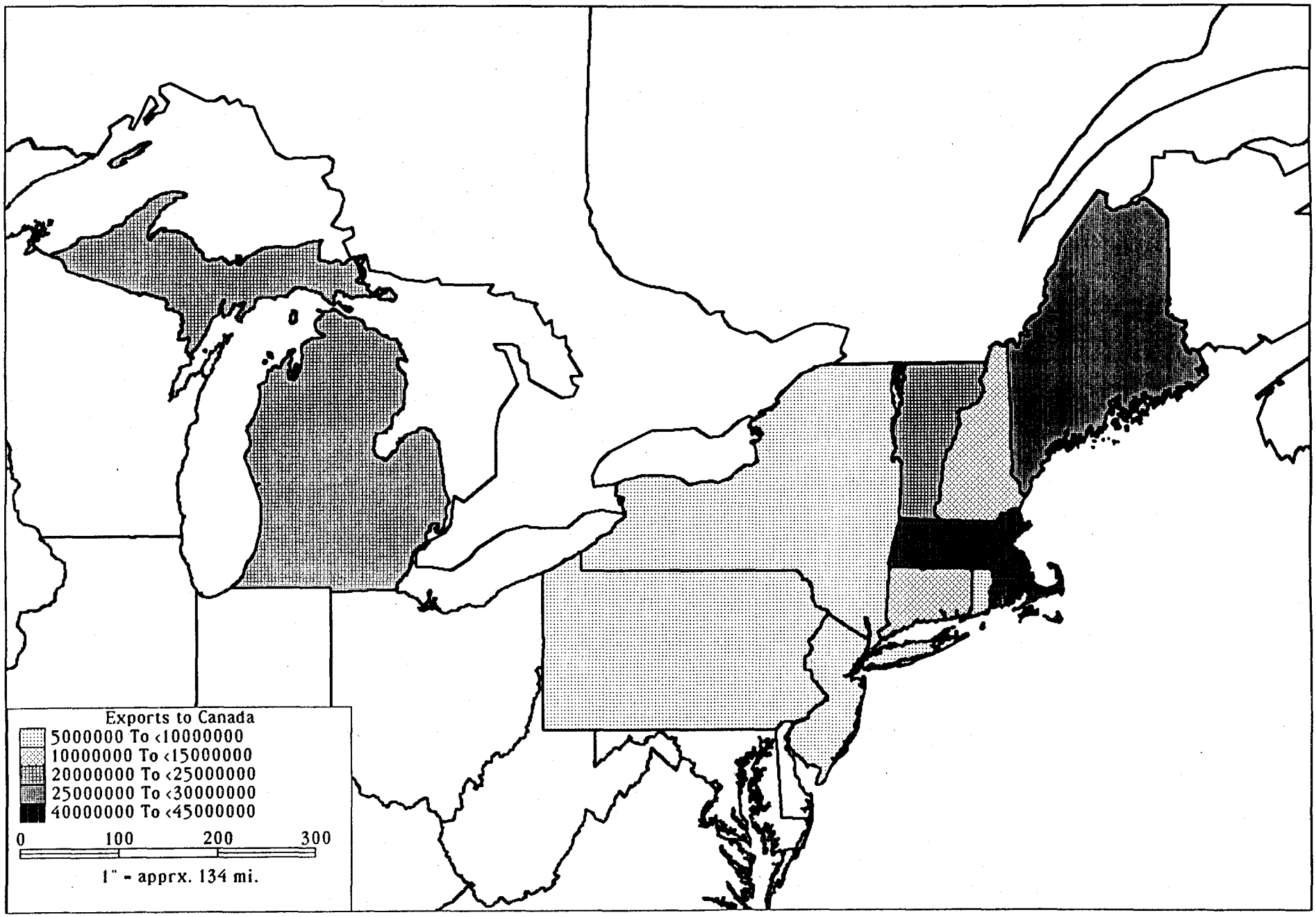
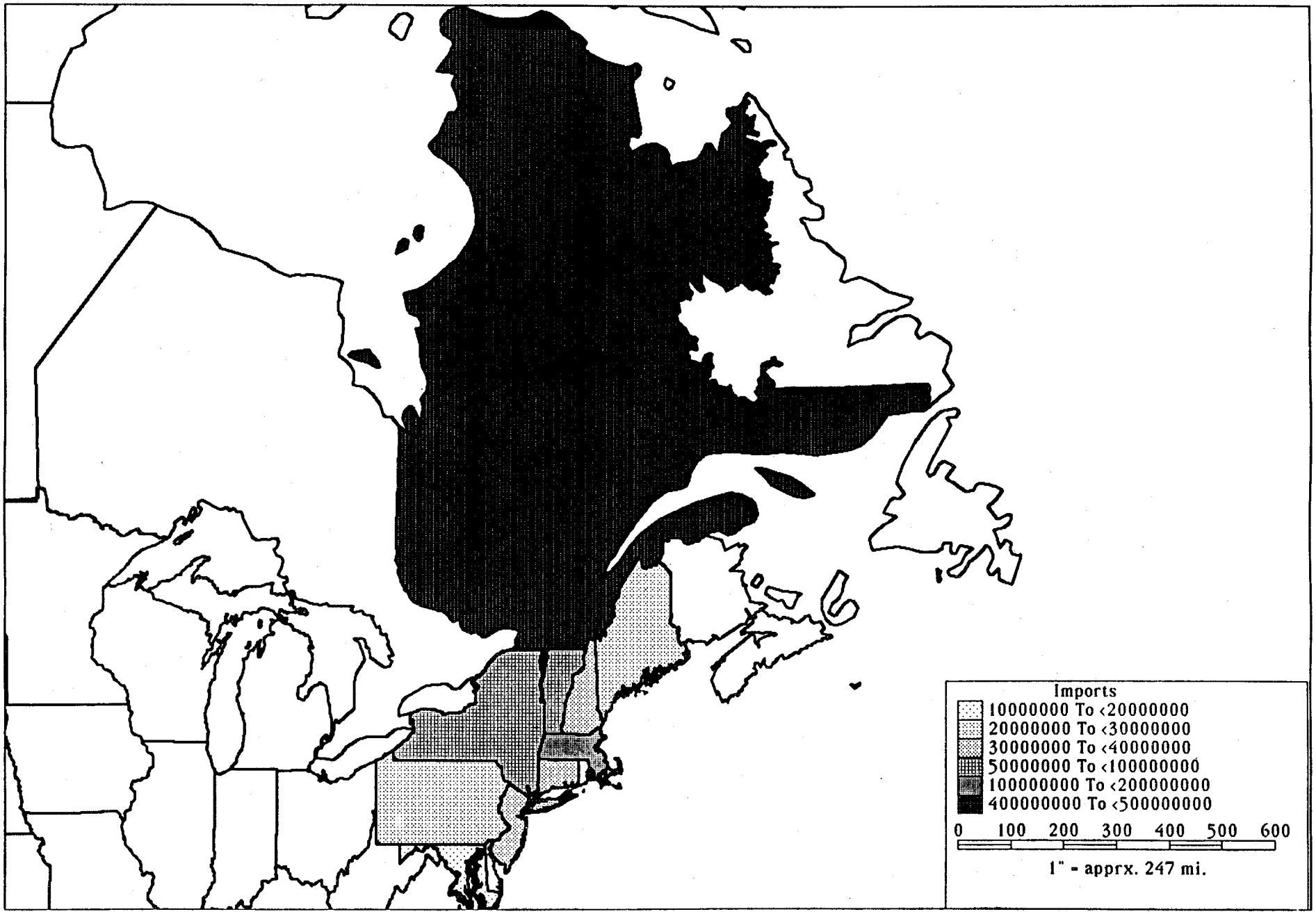


Figure 3-25. Major Origins and Destinations through Derby Line, VT, 1992 US Imports, (in dollars)



3.5.4.4 Norton - The top ten o/d pairs account for 84 percent of exports and 71 percent of imports. Norton, like Derby Line, serves inter-regional trade. California and British Columbia are outlying sources of export and import trade. They represent rather small percentages of the total trade through the port. These trade patterns are shown in Figures 3-26 and 3-27.

In summary, the ports of this frontier except for Champlain-Rouses Point are predominantly serving intra-regional trades. Champlain-Rouses Point has better access southward and as a result also serves trades to and from the southeast.

3.5.5 Ports in the Maine Frontier

3.5.5.1 Jackman - The top ten o/d pairs account for 98 percent of exports and 91 percent of imports. This port primarily serves local trade between Quebec and Maine and secondarily New England and Ontario. Maps of the port flows are shown in Figures 3-28 and 3-29.

3.5.5.2 Madawaska - The top ten o/d pairs account for 97 percent of exports and 96 percent of imports. Madawaska is not a commercial port and as a result the volume of trade transiting the port is understandably small. Imports are largely local flows between New Brunswick and Maine. Exports show a high proportion originating in Michigan and Wisconsin. See Figures 3-30 and 3-31 for details.

3.5.5.3 Houlton - The top ten o/d pairs account for 59 percent of exports and 64 percent of imports. Houlton is at the northern end of Interstate 95, the major route south through Maine. This may account for the dispersion of origins and destinations. The port serves the Maritimes and New England. However, the largest originating state for exports is South Carolina. Thus, the trades transiting this port are predominantly inter-regional. See Figures 3-32 and 3-33.

3.5.5.4 Calais - The top ten o/d pairs account for 66 percent of exports and 73 percent of imports. Calais, like Houlton, serves the Maritimes and New England. It also has a relatively large inter-regional trade flow from the eastern Mid-West and Mid-Atlantic states. This is shown in Figures 3-34 and 3-35.

In summary, two of the Maine ports are basically serving local needs. Houlton and Calais serve intra-regional flows and some inter-regional flows, Houlton to the southeast and Calais to the west.

3.6 U.S.-CANADA WATERBORNE TRADE

The waterborne trade between the U.S. and Canada includes traffic from the Great Lakes and St. Lawrence Seaway and from deep water ports on the Atlantic, Gulf, and Pacific coasts. The sector has experienced rather drastic changes over the study period. Between 1989 and 1992, U.S. exports by water to Canada fell by 55.6 percent in dollar terms, while

Figure 3-26. Major Origins and Destinations through Norton, VT, 1992 US Exports, (in dollars)

Figure 3-27. Major Origins and Destinations through Norton, VT, 1992 US Imports, (in dollars)

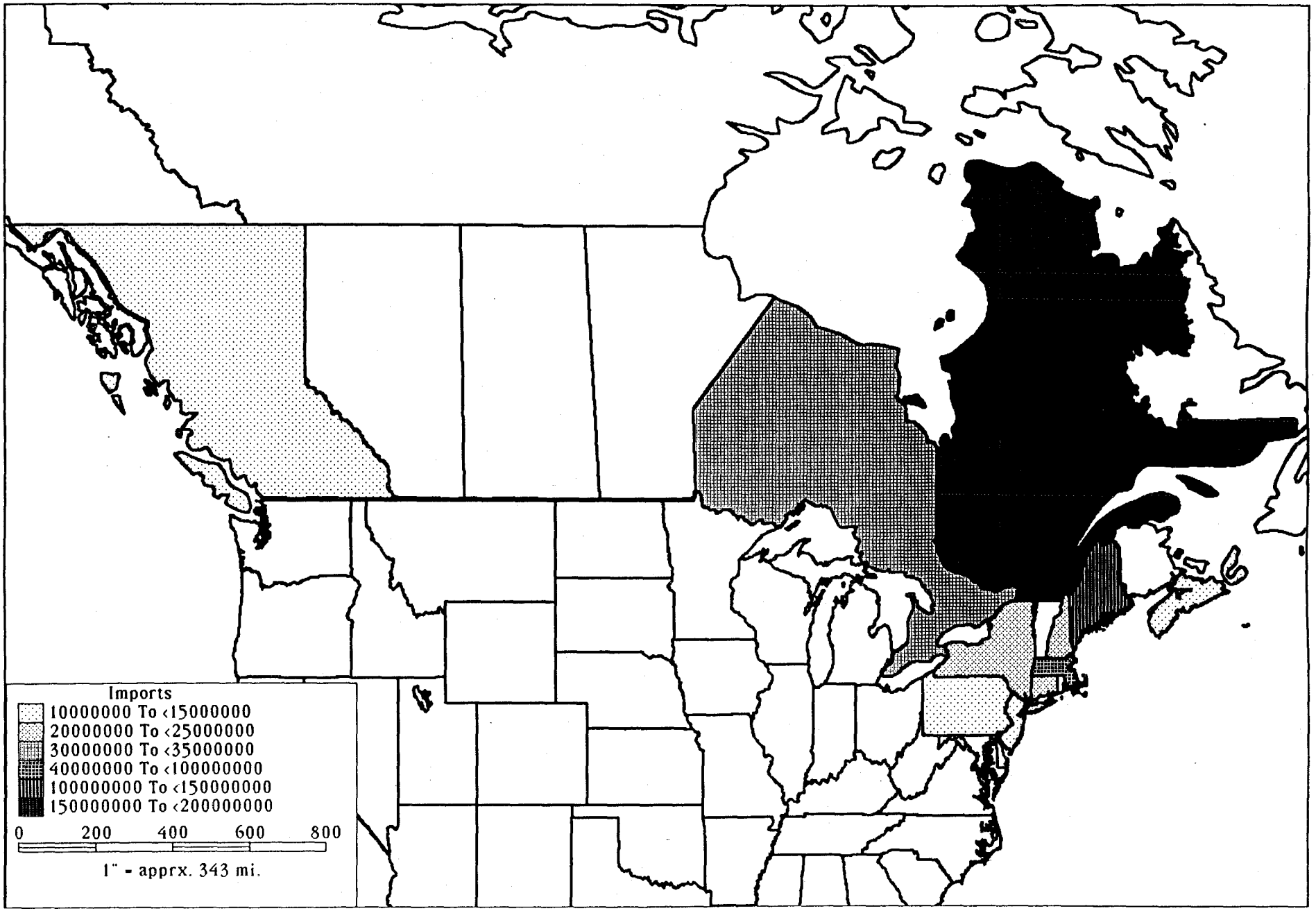


Figure 3-28. Major Origins and Destinations through Jackman, ME, 1992 US Exports, (in dollars)

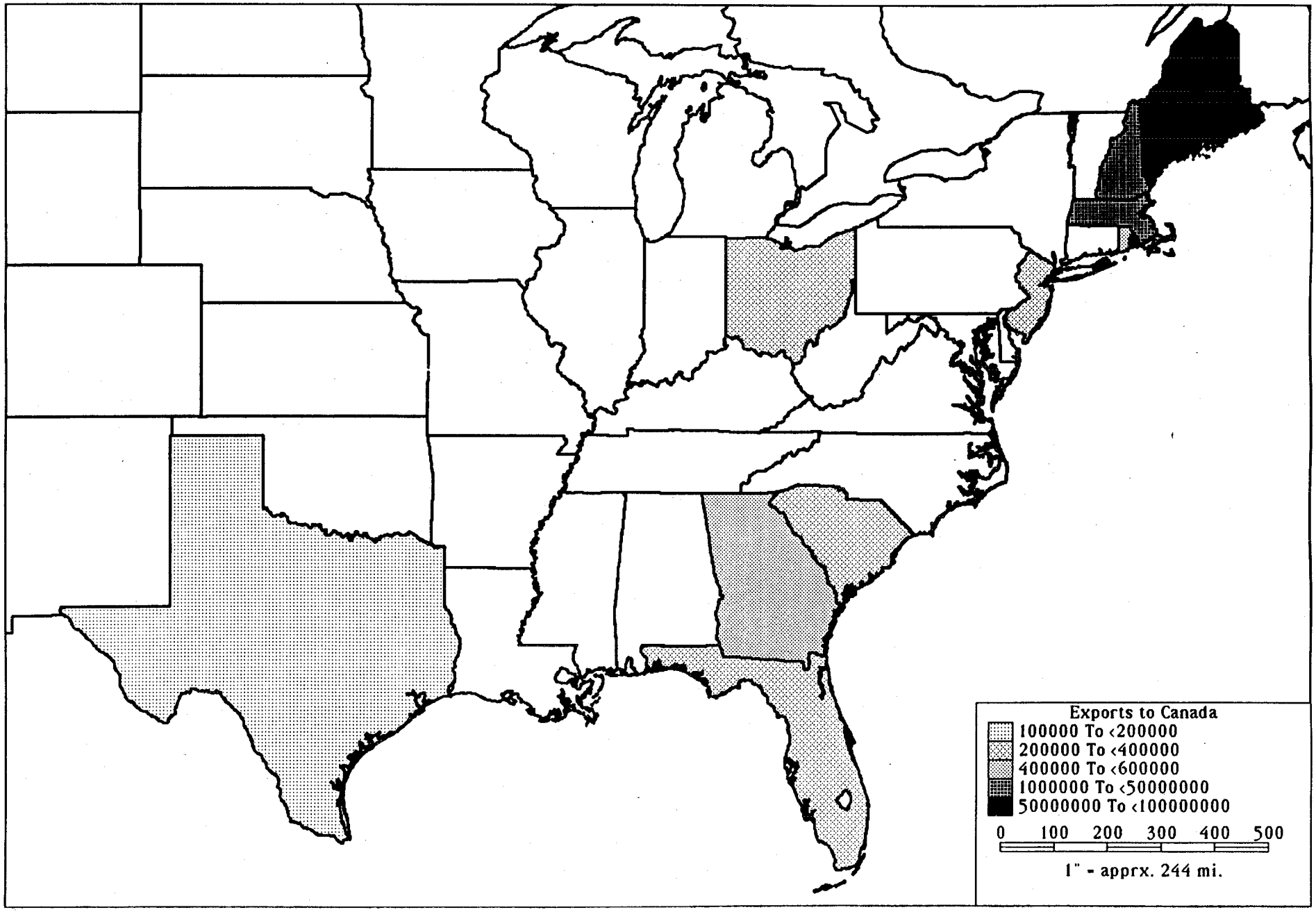


Figure 3-29. Major Origins and Destinations through Jackman, ME, 1992 US Imports, (in dollars)

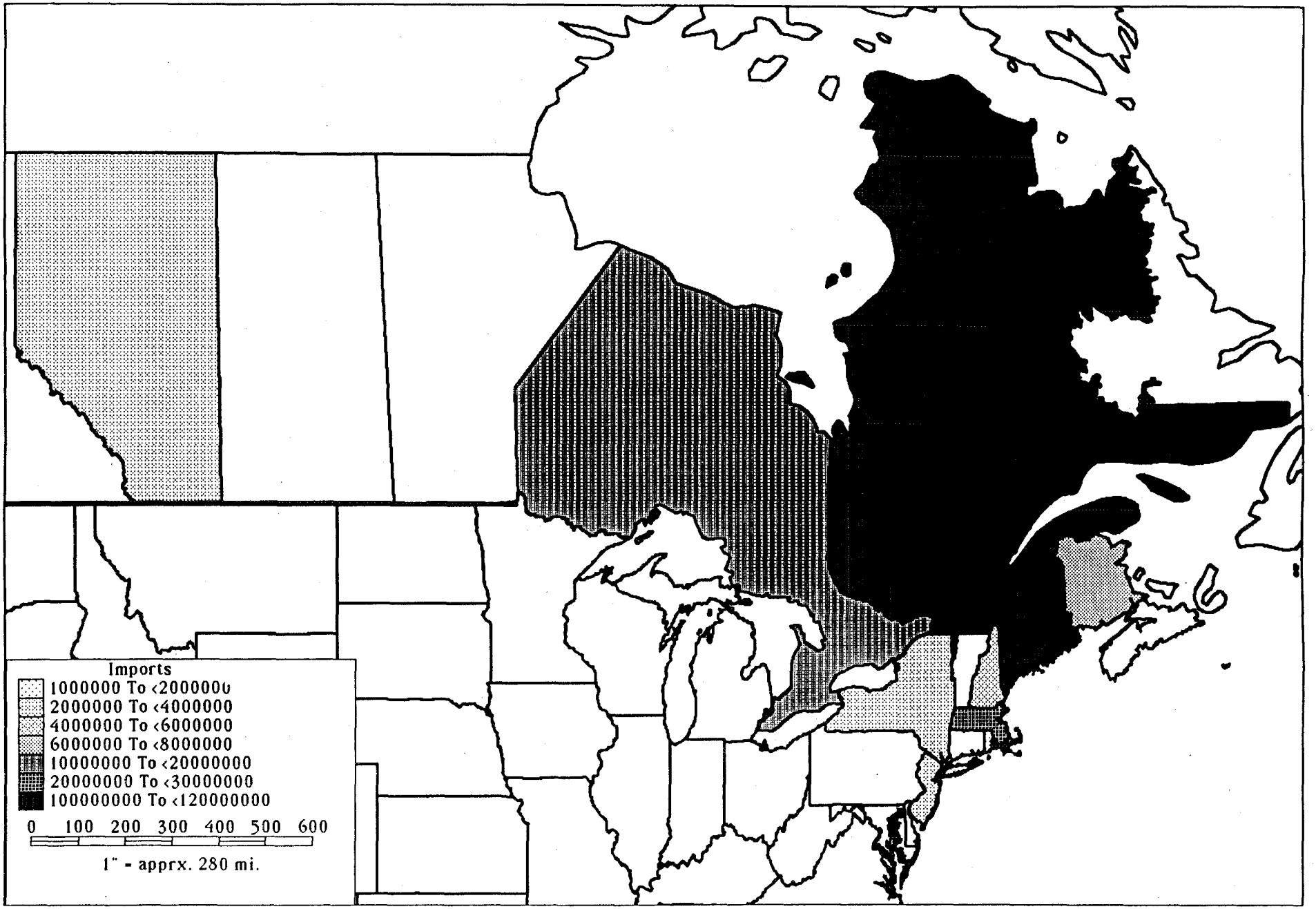


Figure 3-30. Major Origins and Destinations through Madawaska, ME, 1992 US Exports, (in dollars)

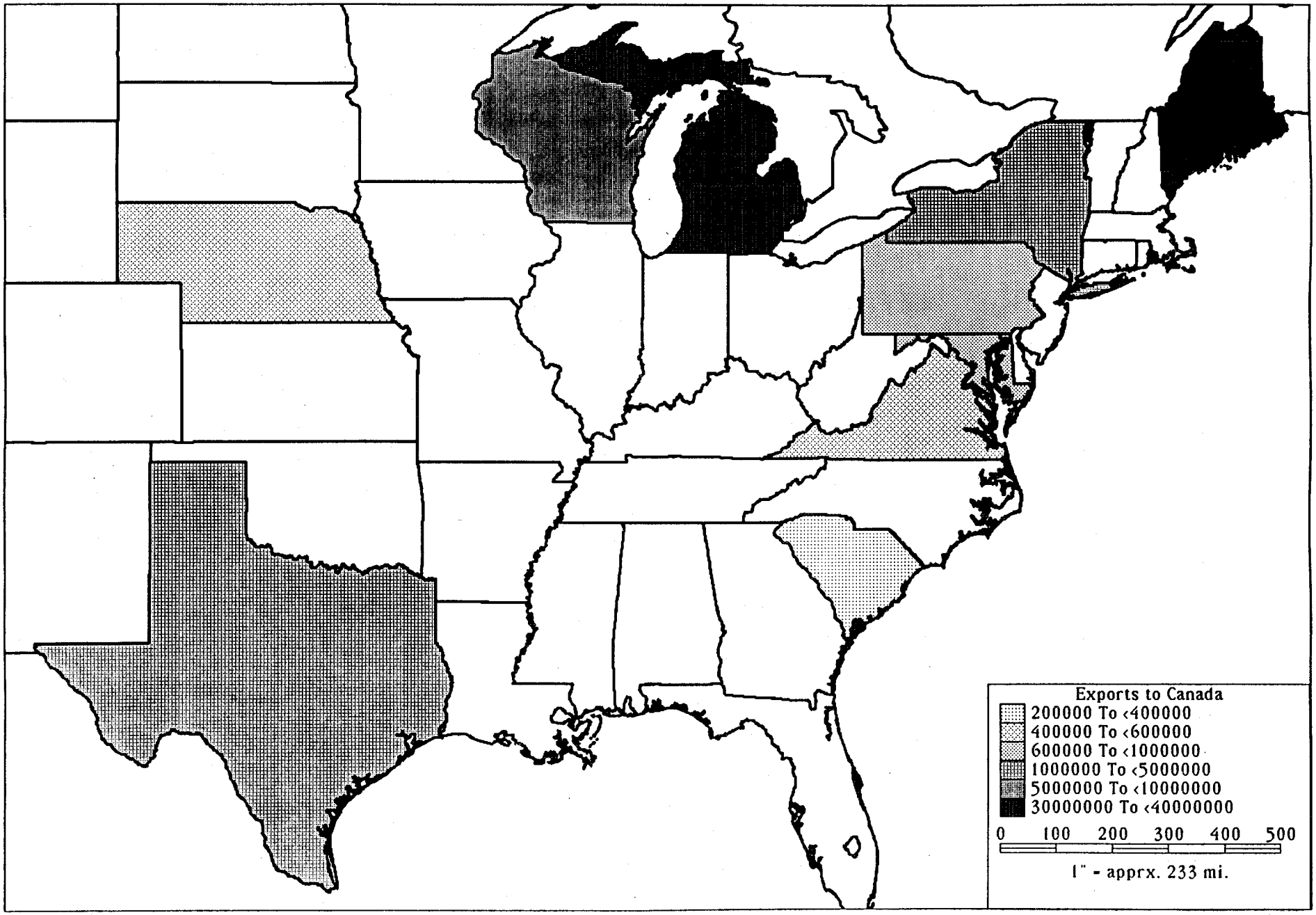


Figure 3-31. Major Origins and Destinations through Madawaska, ME, 1992 US Imports, (in dollars)

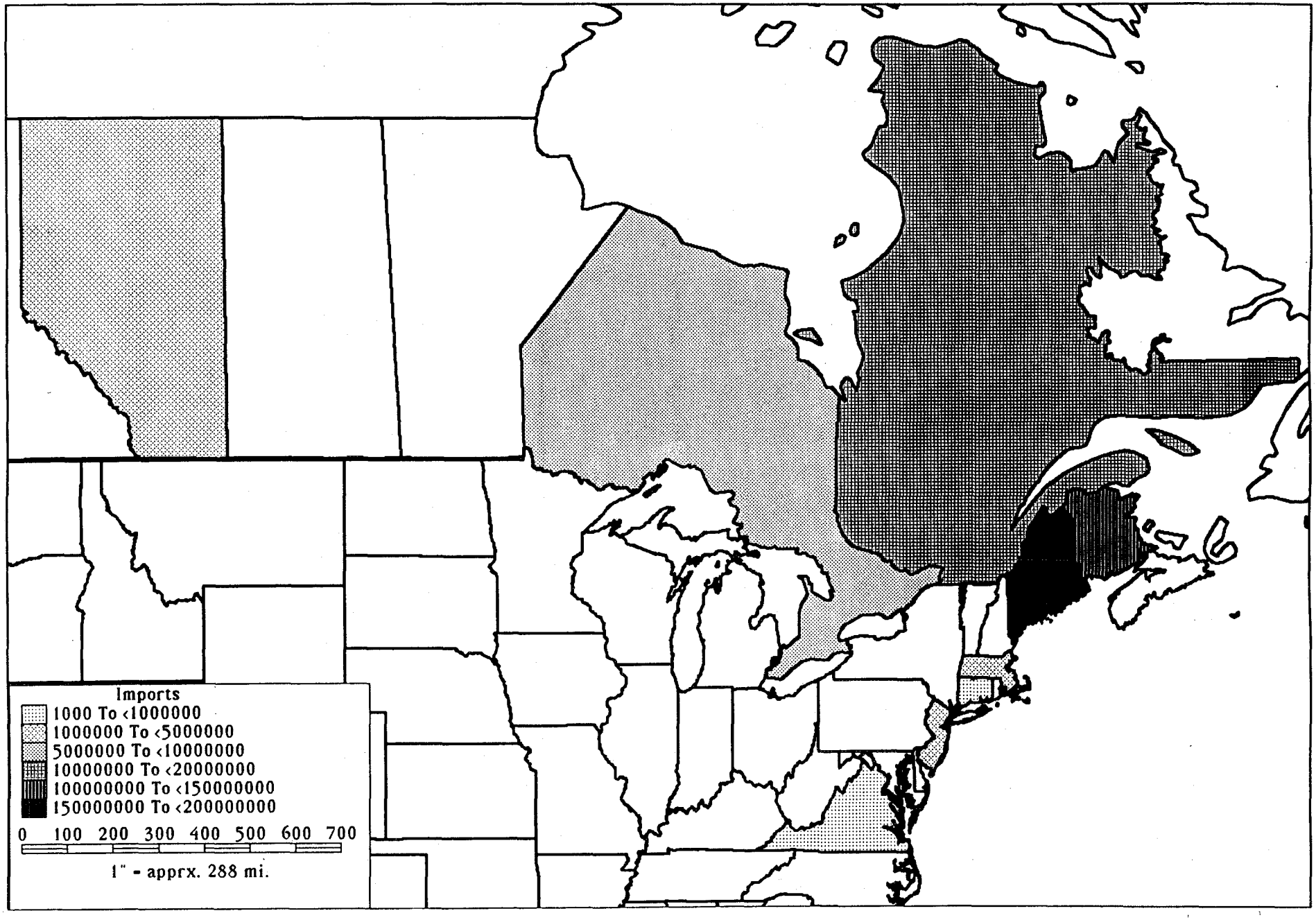


Figure 3-32. Major Origins and Destinations through Houlton, ME , 1992 US Exports, (in dollars)

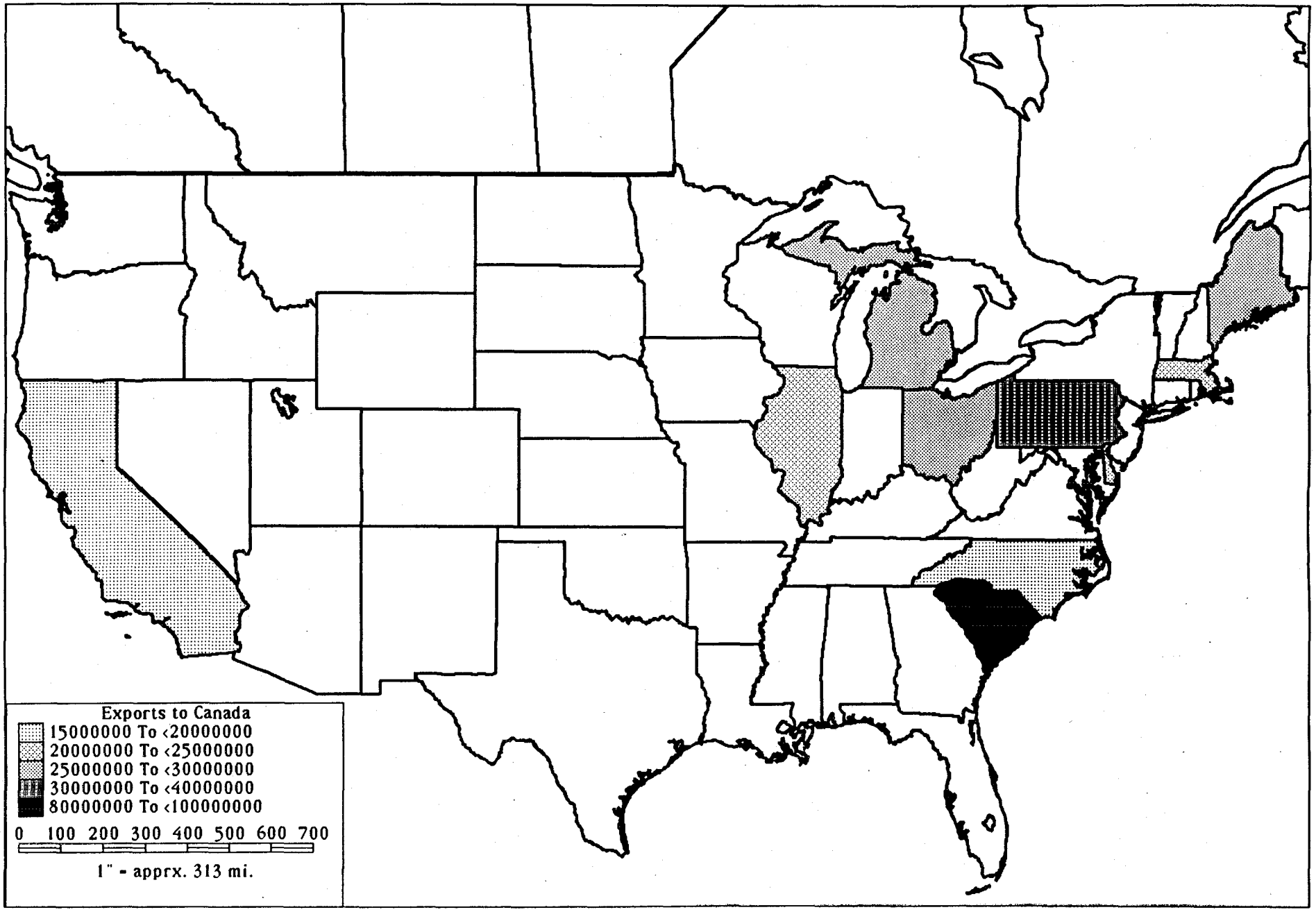


Figure 3-33. Major Origins and Destinations through Houlton, ME, 1992 US Imports, (in dollars)

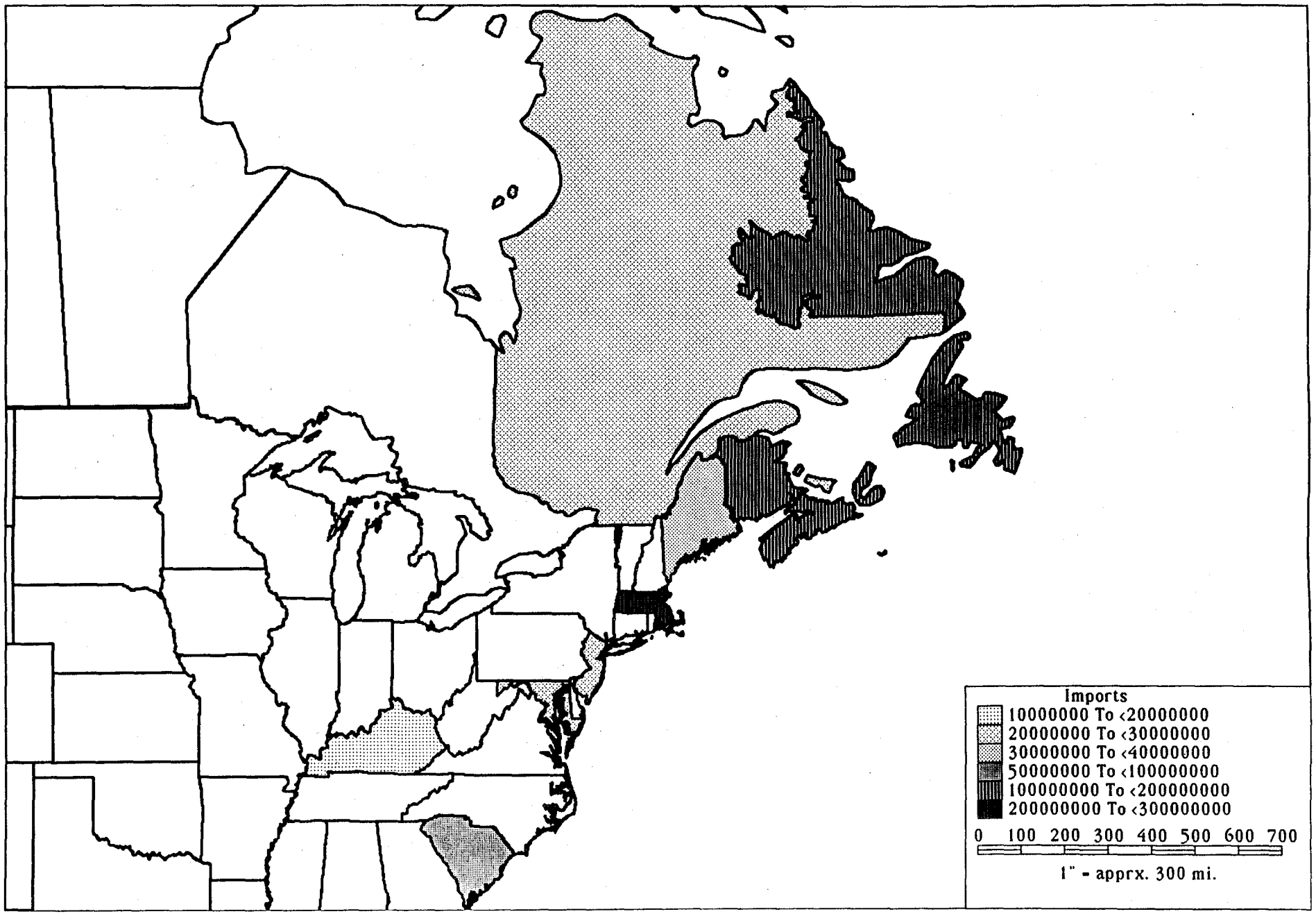


Figure 3-34. Major Origins and Destinations through Calais, ME, 1992 US Exports, (in dollars)

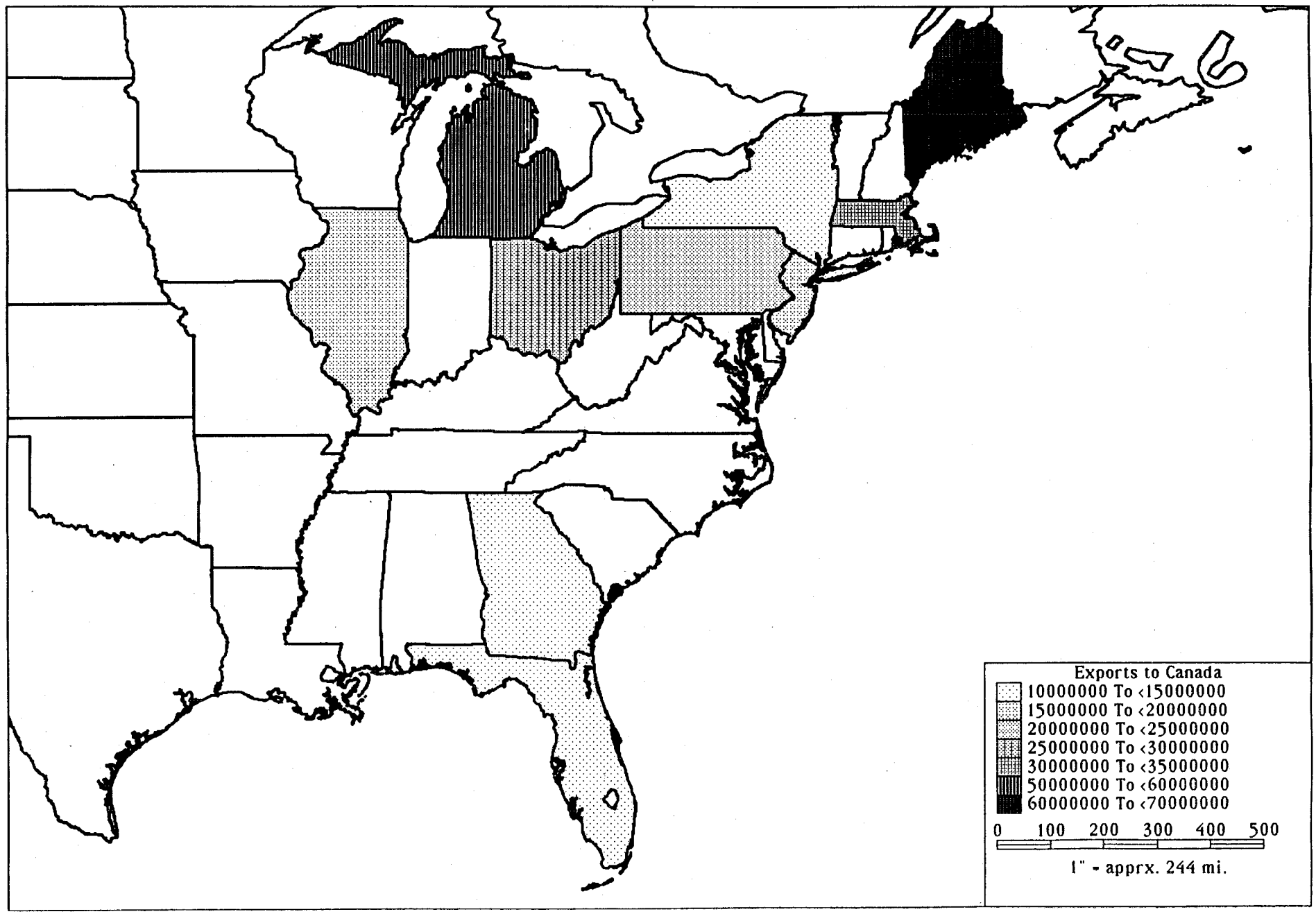
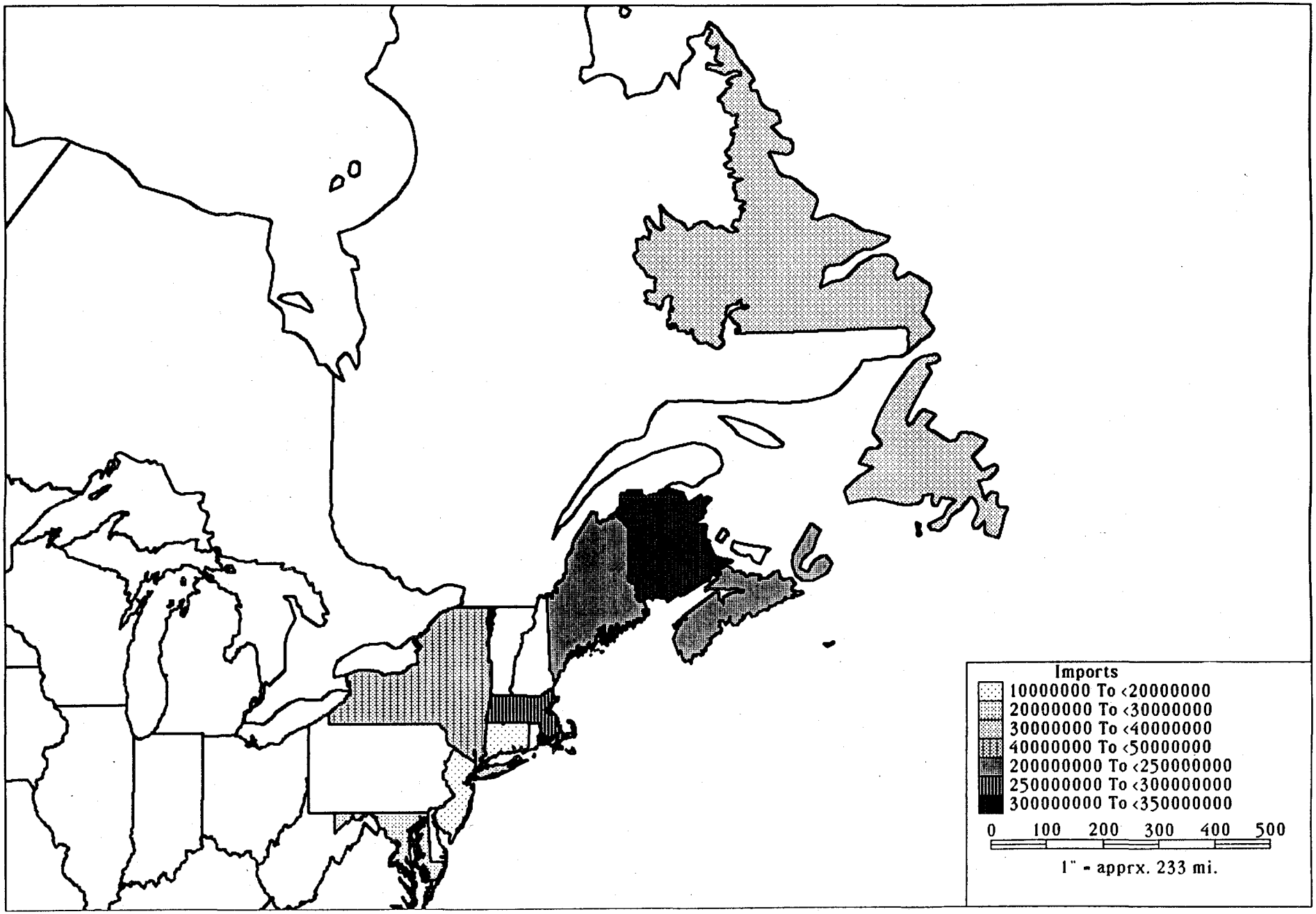


Figure 3-35. Major Origins and Destinations through Calais, ME, 1992 US Imports, (in dollars)



imports rose by 96.1 percent. These changes are a result of shifts in one commodity class, i.e., vehicles.[7] Approximately, three-fourths of the decline in exports are attributable to a drop in the value of vehicles (and parts) from $1,459 million in 1989 to $17 million in 1992. On the other hand, nearly all of the increase in the value of imports by water can be attributed to vehicles, which grew from $1,292 million in 1989 to $6,560 million in 1992.

This change in the direction of flow for vehicles does not lead to a comparable picture when measured in tonnage. Between 1989 and 1992, export tonnages fell by 28 percent. This is far lower than the rate of decline in value because vehicles represent a high value commodity for the maritime industry. Likewise the increase in the value of imports by water is not paralleled by an increase in the tonnage of imports. Imports actually fell from 1989 to 1992 by 9.1 percent. Thus low valued tonnage was being replaced by high valued tonnage.

By 1992, the distribution of exports had become highly concentrated in minerals and metals, which in dollar terms had declined over the 4-year period by 22 percent in value terms and 26 percent in tonnage. Imports of minerals and metals remained quite constant during the period in both value and tonnage terms. By 1992, minerals and metals was still the major import commodity when measured in tons, but was a distant second to vehicles when measured in dollars.

Trends in the dollar value of waterborne trade can be seen in Tables 3-34 and 3-35. The composition of the trade can also be seen in these tables. The corresponding tables for trade as measured in tonnage are Tables 3-36 and 3-37.

The National Ports and Waterways Institute (NPWI), Louisiana State University, has recently completed an assessment of the infrastructure supporting the waterborne trade flows between the U.S. and Canada[8] Table 3-38 contains a summary of the U.S. Great Lakes, Atlantic Coast and Gulf ports engaged in trade with Canada. As might be expected, the trade is concentrated in a few major ports; for example, the top ten ports account for approximately 54 percent of the two way flows. The table also shows the breakout by commodity type. The majority of the trade is in dry bulks, and this is consistent with the commodity discussion above.

NPWI provided estimates of the capacity in the port system to accommodate existing and increased trade. Overall the port system was found to have excess capacity of approximately 30 percent. For Atlantic Coast ports, trade with Canada represents only 7 percent of foreign trade. For the Gulf ports, Canadian trade is only 1 percent of foreign trade. Given the current excess capacity, these ports have more than adequate infrastructure to accommodate the Canadian trade.

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[7]The commodity classification used in this study was selected to reflect the distribution of goods moving by land modes. As a result, this classification is unlikely to be the best scheme for other modes. However, for consistency with the previous discussions, the same classification will be used.

[8]U.S. Border Crossings with Canada and Mexico-Port Facilities, Inventory, and Constraints, August 1993.

TABLE 3-34. U.S. EXPORTS TO CANADA BY COMMODITY AND MODE AND VALUE - EXPORTS BY WATER

COMMODITY CLASS	1989		1990		1991		1992	
	$ mil	%	$ mil	%	$ mil	%	$ mil	%
AGRICULTURAL	85	2	94	5	53	4	79	5
MINERALS/METALS	1426	41	1385	71	994	67	1110	72
CHEMICALS/PLASTICS	421	12	272	14	287	19	222	14
WOOD/PAPER/PULP	41	1	38	2	32	2	19	1
MACHINE/APPLIANCES	25	1	76	4	90	6	90	6
VEHICLES	1479	42	55	3	23	2	17	1
MISCELLANEOUS	5	0	18	1	11	1	8	1
TOTAL	3482	100	1938	100	1490	100	1545	100

TABLE 3-35. U.S. IMPORTS FROM CANADA BY COMMODITY AND MODE AND VALUE - IMPORTS BY WATER

COMMODITY CLASS	1989		1990		1991		1992	
	$ mil	%	$ mil	%	$ mil	%	$ mil	%
AGRICULTURAL	140	3	194	2	119	1	179	2
MINERALS/METALS	1757	33	2324	24	1897	18	1710	16
CHEMICALS/PLASTICS	364	7	487	5	514	5	536	5
WOOD/PAPER/PULP	1576	30	1367	14	1142	11	903	9
MACHINE/APPLIANCES	150	3	519	5	392	4	497	5
VEHICLES	1293	24	4755	49	6316	61	6560	63
MISCELLANEOUS	29	1	28	0	27	0	29	0
TOTAL	5309	100	9675	100	10406	100	10414	100

TABLE 3-36. U.S. EXPORTS TO CANADA BY COMMODITY AND MODE AND WEIGHT - EXPORTS BY WATER

COMMODITY CLASS	1989		1990		1991		1992	
	kg mil	%	kg mil	%	kg mil	%	kg mil	%
AGRICULTURAL	400	1	255	1	65	0	318	1
MINERALS/METALS	30581	91	24054	93	18952	94	22734	94
CHEMICALS/PLASTICS	1601	5	700	3	976	5	898	4
WOOD/PAPER/PULP	277	1	142	1	165	1	93	0
MACHINE/APPLIANCES	13	0	33	0	57	0	35	0
VEHICLES	585	2	7	0	3	0	3	0
MISCELLANEOUS	10	0	5	0	3	0	3	0
TOTAL	33468	100	25195	100	20222	100	24084	100

TABLE 3-37. U.S. IMPORTS FROM CANADA BY COMMODITY AND MODE AND WEIGHT - IMPORTS BY WATER

COMMODITY CLASS	1989		1990		1991		1992	
	kg mil	%	kg mil	%	kg mil	%	kg mil	%
AGRICULTURAL	653	2	647	2	547	2	1001	3
MINERALS/METALS	30084	79	32322	80	27913	79	28021	79
CHEMICALS/PLASTICS	2800	7	3114	8	3010	8	2778	8
WOOD/PAPER/PULP	4485	12	3479	9	3011	8	2692	8
MACHINE/APPLIANCES	29	0	96	0	53	0	63	0
VEHICLES	215	1	696	2	891	3	991	3
MISCELLANEOUS	35	0	35	0	55	0	40	0
TOTAL	38301	100	40390	100	35480	100	35586	100

TABLE 3-38. U.S. EAST COAST-CANADIAN TRADE, 1991

U.S. Ports trading with		1991 Trade 1000ton/yr			General Cargo			Non-petroleum liquids			Petroleum oil & products			Bulk Grain			Dry Bulk		
code	Canada	Total	Exports	Imports	Total	Exports	Imports	Total	Exports	Imports	Total	Exports	Imports	Total	Exports	Imports	Total	Exports	Imports
4105	TOLEDO OHIO	4,661	4,116	545	32	0	32				91	52	39	204	157	47	4,334	3,907	427
4108	ASHTABULA OHIO	3,838	3,606	232	0		0										3,838	3,606	232
1303	BALTIMORE MD.	2,488	42	2,446	38	0	38	0		0	117		117	24	24		2,310	18	2,291
3601	DULUTH MINN.	2,280	2,027	253	0	0					7	0	7	344	325	19	1,929	1,702	227
3608	SUPERIOR WIS.	2,251	1,884	368	202	0	202	0		0	29		29	939	814	125	1,081	1,070	12
0401	BOSTON MA.	2,099	88	2,011	2	1	0				1,887	82	1,805				211	5	206
4101	CLEVELAND OHIO	2,084	70	2,013	0	0					58	39	18				2,026	31	1,995
1101	PHILADELPHIA PA.	1,979	251	1,729	12	0	12				9		9	0	0		1,958	250	1,708
1001	NEW YORK N.Y.	1,970	126	1,845	272	68	204	11	0	10	899	54	845	0	0		789	3	786
3801	DETROIT MICH.	1,485	355	1,130	191	14	177	0	0	0	126	45	82				1,166	296	870
3802	SAULT ST. MARIE MICH.	1,352	133	1,219	1,029	0	1,029	0		0	5	2	2				318	130	188
1901	MOBILE AL.	1,170	10	1,160	3	3					6	6					1,160		1,160
0101	PORTLAND ME.	982	0	982	31	0	31				940		940				11		11
5301	HOUSTON TEX.	904	345	559	150	19	131	94		94	578	265	313				81	60	21
3901	CHICAGO ILL.	878	105	773	64	14	50	23		23	71	5	66				720	86	634
1803	JACKSONVILLE FL.	843	129	714	45	6	39				254	123	131				545		545
3905	GARY IND.	766	53	713	4		4										762	53	709
2004	BATON ROUGE LA.	709	129	580	21	0	21	4	4		265		265				419	125	294
0904	OSWEGO N.Y.	704	89	615	55	0	55				286	31	256				363	58	305
3701	MILWAUKEE WIS.	678	224	455	0	0								224	224		455		455
0131	PORTSMOUTH N.H	620	0	620	1	0	1				344		344				275		275
1801	TAMPA FL.	595	74	521	70	1	69										526	73	452
0901	BUFFALO-NIAGARA FALLS N	579	336	243	9	1	7				229	103	126	97	0	97	244	231	13
1703	SAVANNAH GA.	543	117	426	104	9	95				13		13				426	108	318
5312	CORPUS CHRISTI, TEXAS	542	537	5	539	534	5										3	3	
3804	SAGINAW-BAY CITY MICH.	533	89	444							3		3				529	89	440
1401	NORFOLK VA.	436	8	428	20	4	16				21		21				394	4	390
2017	LAKE CHARLES, LA.	431	207	224	178	178											254	30	224
0903	ROCHESTER N.Y.	429	270	159	0	0	0							9		9	421	270	150
3809	MARQUETTE MICH.	427	427														427	427	
1501	WILMINGTON N.C	413	0	413	99	0	99	107		107							206		206
0412	NEW HAVEN	397	90	307	3	2	1				340	87	253				54	1	53
1107	CAMDEN N.J.	360	0	360	19	0	19										341		341
1701	BRUNSWICK GA.	357	0	357	8	0	8										349		349
1816	PORT CANAVERAL	355	60	295	156		156				170	60	110				29		29
1103	WILMINGTON DEL	348	1	347	52	1	52				55		55				240		240
3803	SAULT ST.MARIE	338	261	76	3		3				55	5	51				280	257	23
3843	ALPENA MICH.	319	299	21							5		5				315	299	16
3818	ROGERS CITY MICH.	310	294	16													310	294	16
4107	SANDUSKY OHIO	262	212	50										30		30	232	212	20
1602	GEORGETOWN S.C	261	19	242	19	19											242		242
5306	TEXAS CITY	236	9	227	16	9	7	12		12	208		208						
2002	NEW ORLEANS LA.	227	18	209	9	0	9				15		15				203	18	185
1002	ALBANY N.Y.	209	0	209	0	0											209		209
4106	ERIE PA.	200	0	200	3	0	3										198		198
2101	PORT ARTHUR TEX.	193	118	75							119	45	75				73	73	
0152	SEARSPORT,ME	181		181							167		167				14		14
0502	PROVIDENCE R.I	179	0	179	5	0	4				99		99				76		76
3815	MUSKEGON MICH.	158		158													158		158
1601	CHARLESTON S.C.	152	50	102	29	1	28										123	49	74

TABLE 3-38. U.S. EAST COAST-CANADIAN TRADE, 1991 (cont'd)

3842	PRESQUE ISLE MICH.	143	142	1	1	0	0										143	142	0
3703	GREEN BAY WIS.	142		142							17		17				125		125
0712	CHAMPLAIN-ROUSES POINT	139	139	0	4	4	0				127	127					9	9	
5402	ALEXANDRIA VA.	119	0	119	119	0	119												
1102	CHESTER PA.	117	0	117	117	0	117												
0701	OGDENSBURG N.Y.	116	91	25	0	0											116	91	25
5311	FREEPORT, TEXAS	103	99	4	1		1										103	99	3
5310	GALVESTON, TEXAS	98	11	87	0	0					87		87				11	11	
0132	BELFAST, ME.	94	0	94	0	0					69		69				25		25
4121	LORAIN OHIO	94		94	4		4										90		90
3844	FERRSBURG MICH.	81		81													81		81
0410	BRIDGEPORT	77	0	77	2	0	1				75		75						
5203	PORT EVERGLADES FL.	72	0	72	41	0	41				30		30						
3820	MACKINAC ISLAND MICH.	66		66							66		66						
4117	HURON OHIO	63		63										63		63			
5201	MIAMI FL.	58	0	58	30	0	30										28		28
0906	SYRACUSE N.Y.	55		55							45		45				10		10
2010	GRAMERCY LA.	54	24	31	31	0	31										24	24	
1903	PASCAGOULA MISS.	42	42								42	42							
2013	ST. ROSE LA.	40	35	5							40	35	5						
1511	BEAUFORT-MOREHEAD CITY	39	14	25													39	14	25
3904	E. CHICAGO IND.	34		34													34		34
1105	PAULSBORO N.J.	33	33								33	33							
3819	DE TOUR VILLAGE MICH.	33	33														33	33	
2301	BROWNSVILLE TEX.	32	32								32	32							
2104	BEAUMONT TEX.	30	0	29	0	0					29		29						
0405	NEW BEDFORD MA	27		27													27		27
0407	FALL RIVER MA.	26		26							26		26						
0408	SALEM MA.	23	0	23	0	0					23		23						
0501	NEWPORT R.I.	22	0	22	0	0	0				22		22						
0714	CLAYTON N.Y.	21	21														21	21	
3702	MARINETTE WIS.	18		18	18		18												
0413	NEW LONDON	16		16	16		16												
1902	GULFPORT MISS.	8		8	5		5										3		3
1118	MARCUS HOOK PA	7		7													7		7
3808	ESCANABA MICH.	5		5													5		5
4109	CONNEAUT OHIO	4	4		4	4													
0708	ALEXANDRIA BAY N.Y.	3	3	0	0	0	0	0	0								3	3	
1113	GLOUCESTER CITY N.J.	2	2		2	2													
0103	EASTPORT ME	2	1	0	2	1	0	0	0										
1404	RICHMOND-PETERSBURG VA	1		1	1		1												
0121	ROCKLAND ME.	1	0	0	1	0	0												
	TOTAL 1000 tons/yr	46,876	18,009	28,867	3,891	900	2,991	252	5	247	8,236	1,273	6,962	1,934	1,544	389	32,563	14,286	18,276

For the Great Lakes ports, trade with Canada is 84 percent of foreign trade. However, the level of excess capacity within the Great Lakes system appears more than enough to provide for existing Canadian trade. Table 3-39 compares capacity to actual throughput for the top four Great Lakes ports. Toledo operated closest to capacity in 1991. However, this was less than 50 percent of capacity. As a result, waterborne trade with Canada is not expected to be constrained by capacity in the port system.

TABLE 3-39. CAPACITY OF SELECTED GREAT LAKES PORTS

PORT	Total Capacity 1000 tons/year	1991 Total Throughput	1991 Trade with Canada
Toledo	24,012	11,837	4,661
Ashtabula	9,799	3,838	3,838
Duluth	36,401	2,576	2,488
Superior	21,040	2,960	2,280

3.7 U.S.-CANADA AIRBORNE TRADE

Trade between the U.S. and Canada carried by air grew rapidly over the study period. Exports rose by 38.6 percent and imports by 235.8 percent in dollar terms and by 107.4 percent and 137.1 percent in tonnage terms. As a result it must be true that substantial changes have taken place in the types of commodities carried. Imports have a much higher value per ton than exports, and exports have grown increasingly lower in average value. Unfortunately, the commodity groupings used in this analysis is too crude in terms of airborne cargo to discern what particular changes have taken place.

Data on total U.S. Canada airborne trade are shown in Tables 3-40 and 3-41 for exports and imports in dollars. Tables 3-42 and 3-43 contain the comparable data for trade in tonnage.

TABLE 3-40. U.S. EXPORTS TO CANADA BY COMMODITY AND MODE AND VALUE - EXPORTS BY AIR

COMMODITY CLASS	1989		1990		1991		1992	
	$ mil	%	$ mil	%	$ mil	%	$ mil	%
AGRICULTURAL	20	0	33	1	28	0	32	0
MINERALS/METALS	69	2	118	2	122	2	108	2
CHEMICALS/PLASTICS	198	4	299	5	320	5	379	6
WOOD/PAPER/PULP	61	1	48	1	63	1	75	1
MACHINE/APPLIANCES	2433	53	3117	52	3112	53	3577	56
VEHICLES	1242	27	1780	29	1519	26	1541	24
MISCELLANEOUS	593	13	643	11	699	12	682	11
TOTAL	4616	100	6036	100	5861	100	6394	100

TABLE 3-41. U.S. IMPORTS FROM CANADA BY COMMODITY AND MODE AND VALUE - IMPORTS BY AIR

COMMODITY CLASS	1989		1990		1991		1992	
	$ mil	%	$ mil	%	$ mil	%	$ mil	%
AGRICULTURAL	10	1	23	1	21	1	22	0
MINERALS/METALS	9	1	23	1	25	1	29	1
CHEMICALS/PLASTICS	28	2	65	2	61	1	97	2
WOOD/PAPER/PULP	6	0	18	1	13	0	18	0
MACHINE/APPLIANCES	345	25	1020	31	1417	34	1471	32
VEHICLES	355	26	899	27	1063	26	1123	25
MISCELLANEOUS	600	44	1268	38	1542	37	1783	39
TOTAL	1353	100	3315	100	4142	100	4584	100

TABLE 3-42. U.S. EXPORTS TO CANADA BY COMMODITY AND MODE AND WEIGHT - EXPORTS BY AIR

COMMODITY CLASS	1989		1990		1991		1992	
	kg 000s	%	kg 000s	%	kg 000s	%	kg 000s	%
AGRICULTURAL	9757	16	13910	8	7913	6	8809	7
MINERALS/METALS	7910	13	25179	15	15160	12	13117	11
CHEMICALS/PLASTICS	6674	11	28514	17	13653	11	13190	11
WOOD/PAPER/PULP	4270	7	10826	6	6914	6	8227	7
MACHINE/APPLIANCES	18768	31	35428	21	28122	23	31764	25
VEHICLES	6748	11	30679	18	14283	12	14132	11
MISCELLANEOUS	6022	10	27410	16	36150	30	35525	28
TOTAL	60150	100	171947	100	122196	100	124763	100

TABLE 3-43. U.S. IMPORTS FROM CANADA BY COMMODITY AND MODE AND WEIGHT - IMPORTS BY AIR

COMMODITY CLASS	1989		1990		1991		1992	
	kg 000s	%	kg 000s	%	kg 000s	%	kg 000s	%
AGRICULTURAL	2329	20	5212	10	5170	18	4975	18
MINERALS/METALS	887	8	1446	3	1837	6	1030	4
CHEMICALS/PLASTICS	791	7	17986	34	2504	9	2326	8
WOOD/PAPER/PULP	770	7	9636	18	2249	8	2101	7
MACHINE/APPLIANCES	3128	26	8400	16	9604	33	9672	35
VEHICLES	1661	14	4514	9	4076	14	3662	13
MISCELLANEOUS	2251	19	5021	10	3921	13	4253	15
TOTAL	11819	100	52216	100	29362	100	28019	100

4. EMERGING TRADE CORRIDORS

4.1 INTRODUCTION

As discussed above, the corridor concept is not the only, or most important way of categorizing trade flow patterns. Intra-regional and inter-regional patterns are more common, and given the level of analysis permitted by the data, there is little to indicate any substantial shift in patterns. Unfortunately the data are not as informative as hoped. Two approaches to estimating future trade were considered. The first would rely upon modelling efforts on the part of others to forecast future trade flows. The current interest in North American trade that has resulted from the discussion on NAFTA has lead to a series of studies on the consequences of NAFTA. The overall conclusions of many of the most significant studies are reviewed by the International Trade Commission in a recent report.[1] None of these studies examines the issue from a transportation perspective. Forecasts of absolute levels of trade were not critical to the analyses of the differential impacts of NAFTA. Thus, the baseline trade levels are not reported or evaluated on their own merits. In a subsequent study, the International Trade Commission, estimated the impacts of NAFTA on selected industries.[2] This analysis drew upon the earlier report. In general, the industry-specific impacts are estimated to be minimal and the underlying growth patterns should be attained either with or without NAFTA. Such a conclusion is to be expected since the U.S.-Canada Free Trade Agreement has substantially eliminated the barriers to trade.

The second approach is used in this study. The basic trends in trade and traffic are extrapolated out for five years in order to provide an approximation of future demands on the system. Unfortunately, the historical data from which a trend line could be determined are limited. The US-Canada Free Trade Agreement became effective in January, 1989. This agreement substantially altered the terms of trade between the two countries so that pre 1989 and post 1989 trends should be expected to differ.[3] Complicating this situation is the fact that the Bureau of the Census data are not detailed enough for this analysis pre-1989. In fact, the 1989 data are also inconsistent with the 1990 to 1992 data and, therefore, have been excluded from the trend line data.

The following sections contain estimates of trade activity and of traffic levels for each of the frontiers. Using these data, future traffic levels are estimated and the implicit growth rates for the frontiers calculated. As will be seen, the demands on the systems from commercial vehicles is small in comparison to existing or future demand from passenger vehicles.

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[1]Economy-Wide Modeling of the Economic Implications of a FTA with Mexico and a NAFTA with Canada and Mexico, United States International Trade Commission, Publications 2516, May 1992.

[2]Potential Impact on the U.S. Economy and Selected Industries of the North American Free-Trade Agreement, United States International Trade Commission, Publication 2596, January 1993.

[3]This expectation should be subject to econometric verification, but this has not been possible for this study.

4.2 TRENDS IN TRADE

Estimates of future trade levels between the U.S. and Canada passing through each of the frontiers are presented in this section. For a given frontier, the average annual rate of growth in each of the seven commodity classes is calculated from the data for 1990 to 1992. Based upon the recommendation of participants at outreach sessions held by FHWA, the trends are estimated for both trade in value terms and for the number of 'shipments.'

Most participants felt that estimating the transportation demands from the dollar volume of trade would be misleading, partially because of changes in the composition of trade obscured by dollars estimates and partially as a result of changes in logistics that favor smaller more frequent shipments. In order to capture this effect, the number of Census records associated with the trade is used as a proxy for the number of shipments. This measure should be a relatively precise estimate of the work load imposed on the FIS but may not be as precise in tracking the number of vehicles involved in trade. However, when used with other measures, the trends in 'shipments' can help bracket the probable levels of future traffic.

The trends for the Michigan Frontier are shown in Table 4-1. Over the period 1990 to 1992, the value of exports grew at nearly 3 percent and imports at 3.4 percent annually. Over this same period, the consumers price index increased at an annual rate of 3.6 percent. Thus in real terms, there was very little change from 1990 to 1992. The export growth is especially affected by a drop in vehicles, the most important export commodity.

Measured in terms of shipments, exports grew at nearly 6 percent and imports at 9.2 percent annually. This supports the contention that logistics practices were changing over the period. Vehicle exports which fell in dollar terms had an increase of 4.7 percent in the number of shipments. Since both rail and truck carriage are included in the trade figures, this increase in shipments in light of a fall in the dollar volume may represent a shift from rail to highway movements of vehicles and parts. These shift, if real, may not continue especially if the Michigan frontier develops rail double stack capability.

The Niagara Frontier trends are shown in Table 4-2. In dollar terms, exports grew at an annual rate of 6.4 percent and imports at 4.8 percent. The dominant commodities for the Niagara Frontier, machinery/appliances and vehicles grew at rates similar to the frontier average. The exception is a fall of 3.1 percent in the imports of machinery/appliances.

The annual growth rates in shipments are 5.1 percent and 5.5 percent for exports and imports, respectively. These rates are higher, on average, than the dollar rates of change if price levels are adjusted by the 3.6 percent CPI increase. However, the differences are not as great as those for Michigan, indicating a somewhat more stable logistics pattern for shippers using the Niagara crossings.

TABLE 4-1. TRENDS IN BORDER TRADE: MICHIGAN FRONTIER

EXPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	1764	1884	6.80	2021	7.27	7.04
Minerals/ Metals	2635	2257	-14.35	2475	9.66	-3.08
Chemicals/ Plastics	3044	3278	7.69	3647	11.26	9.46
Wood/Paper/ Pulp	1246	1294	3.85	1376	6.34	5.09
Machinery/ Appliances	8146	8722	7.07	9681	11.00	9.02
Vehicles	12101	12216	0.95	11439	-6.36	-2.78
Misc. Prod	1197	1187	-0.84	1232	3.79	1.45
TOTAL	30,133	30,838	2.34	31,871	3.35	2.84

IMPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	846	905	6.97	1000	10.50	8.72
Minerals/ Metals	3372	3652	8.30	4068	11.39	9.84
Chemicals/ Plastics	2077	2109	1.54	2526	19.77	10.28
Wood/Paper/ Pulp	2530	2503	-1.07	2664	6.43	2.61
Machinery/ Appliances	3494	3156	-9.67	3445	9.16	-0.70
Vehicles	13596	12294	-9.58	13834	12.53	0.87
Misc. Prod	1249	1311	4.96	1515	15.56	10.13
TOTAL	27,164	25,930	-4.54	29,052	12.04	3.41

TABLE 4-1. TRENDS IN BORDER TRADE: MICHIGAN FRONTIER (cont'd)

EXPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	129.7	131.3	1.23	143.5	9.29	5.19
Minerals/ Metals	153.4	154.8	0.91	171.1	10.53	5.61
Chemicals/ Plastics	146.7	158.0	7.70	179.7	13.73	10.68
Wood/Paper/ Pulp	67.0	68.9	2.84	76.8	11.47	7.06
Machinery/ Appliances	327.8	328.8	0.31	367.6	11.80	5.90
Vehicles	424.4	419.6	-1.13	464.6	10.72	4.63
Misc. Prod	70.1	72.6	3.57	77.7	7.02	5.28
TOTAL	1,319.1	1,334.0	1.13	1,481.0	11.02	5.96

IMPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	54.6	59.5	8.97	69.1	16.13	12.50
Minerals/ Metals	169.0	187.7	11.07	236.9	26.21	18.40
Chemicals/ Plastics	90.6	97.3	7.40	116.2	19.42	13.25
Wood/Paper/ Pulp	136.5	143.9	5.42	163.0	13.27	9.28
Machinery/ Appliances	119.7	114.0	-4.76	121.9	6.93	0.91
Vehicles	264.1	247.3	-6.36	288.1	16.50	4.44
Misc. Prod	77.1	78.6	1.95	91.5	16.41	8.94
TOTAL	911.6	928.3	1.83	1,086.7	17.06	9.18

TABLE 4-2. TRENDS IN BORDER TRADE: NIAGARA FRONTIER

EXPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	791	908	14.79	951	4.74	9.65
Minerals/ Metals	1314	1317	0.23	1351	2.58	1.40
Chemicals/ Plastics	2092	2353	12.48	2659	13.00	12.74
Wood/Paper/ Pulp	1017	1086	6.78	1110	2.21	4.47
Machinery/ Appliances	4844	4871	0.56	5414	11.15	5.72
Vehicles	4063	3379	-16.83	4405	30.36	4.12
Misc. Prod	1061	1127	6.22	1308	16.06	11.03
TOTAL	15,182	15,041	-0.93	17,198	14.34	6.43

IMPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	553	624	12.84	823	31.89	21.99
Minerals/ Metals	2612	2794	6.97	2824	1.07	3.98
Chemicals/ Plastics	1084	1154	6.46	1278	10.75	8.58
Wood/Paper/ Pulp	1131	1162	2.74	1346	15.83	9.09
Machinery/ Appliances	2831	2539	-10.31	2658	4.69	-3.10
Vehicles	7609	6938	-8.82	8347	20.31	4.74
Misc. Prod	1123	1229	9.44	1346	9.52	9.48
TOTAL	16,943	16,440	-2.97	18,622	13.27	4.84

TABLE 4-2. TRENDS IN BORDER TRADE: NIAGARA FRONTIER (cont'd)

EXPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	53.4	60.4	13.11	66.7	10.43	11.76
Minerals/ Metals	103.8	104.5	0.67	105.7	1.15	0.91
Chemicals/ Plastics	127.6	136.7	7.13	153.0	11.92	9.50
Wood/Paper/ Pulp	73.3	75.8	3.41	81.4	7.39	5.38
Machinery/ Appliances	234.5	223.5	-4.69	242.8	8.64	1.75
Vehicles	140.4	140.8	0.28	158.6	12.64	6.28
Misc. Prod	69.8	73.8	5.73	78.9	6.91	6.32
TOTAL	802.8	815.5	1.58	887.1	8.78	5.12

IMPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	61.3	66.1	7.83	75.4	14.07	10.91
Minerals/ Metals	144.1	150.7	4.58	158.4	5.11	4.84
Chemicals/ Plastics	76.4	76.8	0.52	86.3	12.37	6.28
Wood/Paper/ Pulp	88.3	91.2	3.28	103.9	13.93	8.47
Machinery/ Appliances	113.0	113.6	0.53	120.9	6.43	3.44
Vehicles	101.6	93.5	-7.97	100.0	6.95	-0.79
Misc. Prod	95.8	93.0	-2.92	111.9	20.32	8.08
TOTAL	680.5	684.9	0.65	756.8	10.50	5.46

The Eastern New York Frontier shows growth in exports of 9 percent by volume and 3 percent by shipments, reversing the relationships seen before. The growth overall comes from rather significant shifts in the commodities transiting the frontier. The two largest commodity groups in 1990 both experienced declines while other groups, most noticeably vehicles, grew rapidly.

Imports through Eastern New York grew slowly, as a result of drops in the levels of two of the three largest commodity classes. Unlike exports, there was little offsetting growth, and unlike exports, vehicles dropped in value and shipment terms. These figures are contained in Table 4-3.

Trade trends through the Montreal South Frontier are shown in Table 4-4. Exports fell in dollar terms, based on declines in minerals/metals and vehicles. Shipments, on the other hand, increased for nearly all commodity classes if the CPI changes are factored in. Imports, in dollar and shipment terms, increased over the period, in spite of a significant decline in the dollar volume of vehicles. Vehicle shipments, however, increased at nearly the frontier average.

The Maine Frontier experienced increases in exports of 8 percent in dollars and shipments. Imports, however, fell in almost every category. Only chemicals/plastics, of the major commodity groups grew over the period. Trends for Maine are given in Table 4-5.

TABLE 4-3. TRENDS IN BORDER TRADE: EASTERN NEW YORK FRONTIER

EXPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	165	168	1.82	190	13.10	7.31
Minerals/ Metals	556	492	-11.51	539	9.55	-1.54
Chemicals/ Plastics	381	399	4.72	444	11.28	7.95
Wood/Paper/ Pulp	208	246	18.27	288	17.07	17.67
Machinery/ Appliances	619	573	-7.43	609	6.28	-0.81
Vehicles	335	467	39.40	622	33.19	36.26
Misc. Prod	299	312	4.35	354	13.46	8.81
TOTAL	2,563	2,657	3.67	3,046	14.64	9.02

IMPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	121	124	2.48	157	26.61	13.91
Minerals/ Metals	1215	1200	-1.23	1418	18.17	8.03
Chemicals/ Plastics	280	308	10.00	349	13.31	11.64
Wood/Paper/ Pulp	1035	979	-5.41	869	-11.24	-8.37
Machinery/ Appliances	261	243	-6.90	297	22.22	6.67
Vehicles	1196	1069	-10.62	1011	-5.43	-8.06
Misc. Prod	484	750	54.96	537	-28.40	5.33
TOTAL	4,592	4,673	1.76	4,638	-0.75	0.50

TABLE 4-3. TRENDS IN BORDER TRADE: EASTERN NEW YORK FRONTIER (cont'd)

EXPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	8.4	9.3	10.71	9.7	4.30	7.46
Minerals/ Metals	25.2	24.1	-4.37	26.1	8.30	1.77
Chemicals/ Plastics	20.1	20.2	0.50	22.9	13.37	6.74
Wood/Paper/ Pulp	17.2	19.4	12.79	22.2	14.43	13.61
Machinery/ Appliances	30.6	26.2	-14.38	26.1	-0.38	-7.64
Vehicles	14.0	13.7	-2.14	13.8	0.73	-0.72
Misc. Prod	17.5	18.1	3.43	20.3	12.15	7.70
TOTAL	133.0	131.0	-1.50	141.1	7.71	3.00

IMPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	13.6	13.5	-0.74	17.1	26.67	12.13
Minerals/ Metals	49.7	51.9	4.43	54.8	5.59	5.01
Chemicals/ Plastics	20.7	20.4	-1.45	23.2	13.73	5.87
Wood/Paper/ Pulp	56.1	56.1	0.00	58.3	3.92	1.94
Machinery/ Appliances	12.9	12.4	-3.88	13.3	7.26	1.54
Vehicles	11.4	9.0	-21.05	9.7	7.78	-7.76
Misc. Prod	16.7	20.4	22.16	22.2	8.82	15.30
TOTAL	181.1	183.7	1.44	198.6	8.11	4.72

TABLE 4-4. TRENDS IN BORDER TRADE: MONTREAL SOUTH FRONTIER

EXPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	470	547	16.38	525	-4.02	5.69
Minerals/ Metals	268	697	160.07	404	-42.04	-7.09
Chemicals/ Plastics	673	788	17.09	812	3.05	9.84
Wood/Paper/ Pulp	328	354	7.93	375	5.93	6.92
Machinery/ Appliances	4078	4254	4.32	4254	0.00	2.13
Vehicles	1700	813	-52.18	999	22.88	-2.33
Misc. Prod	563	680	20.78	760	11.76	16.19
TOTAL	8,080	8,133	0.66	8,129	-0.05	-0.92

IMPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	487	500	2.67	524	4.80	3.73
Minerals/ Metals	928	901	-2.91	1040	15.43	5.86
Chemicals/ Plastics	448	446	-0.45	558	25.11	11.60
Wood/Paper/ Pulp	15551	1514	-90.26	1838	21.40	8.72
Machinery/ Appliances	2867	3572	24.59	3336	-6.61	7.87
Vehicles	1286	1038	-19.28	815	-21.48	-20.39
Misc. Prod	829	870	4.95	1057	21.49	12.92
TOTAL	22,396	8,841	-60.52	9,168	3.70	4.47

TABLE 4-4. TRENDS IN BORDER TRADE: MONTREAL SOUTH FRONTIER (cont'd)

EXPORTS shipments in 000's

Commodity Class	1990	1991	percent chg 90-91	1992	percent chg 91-92	ave percent 90-92
Agric. Prod	37.7	41.0	8.75	40.8	-0.49	4.03
Minerals/ Metals	27.0	26.0	-3.70	26.6	2.31	-0.74
Chemicals/ Plastics	41.2	45.2	9.71	47.5	5.09	7.37
Wood/Paper/ Pulp	35.1	36.6	4.27	40.7	11.20	7.68
Machinery/ Appliances	81.7	82.1	0.49	84.4	2.80	1.64
Vehicles	32.3	31.6	-2.17	33.8	6.96	2.30
Misc. Prod	38.8	42.7	10.05	44.2	3.51	6.73
TOTAL	293.8	305.2	3.88	318.0	4.19	4.04

IMPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	43.1	43.0	-0.23	48.2	12.09	5.75
Minerals/ Metals	81.8	76.8	-6.11	87.2	13.54	3.25
Chemicals/ Plastics	35.6	35.3	-0.84	43.0	21.81	9.90
Wood/Paper/ Pulp	121.5	119.3	-1.81	139.4	16.85	7.11
Machinery/ Appliances	44.6	45.1	1.12	45.8	1.55	1.34
Vehicles	32.1	31.2	-2.80	35.5	13.78	5.16
Misc. Prod	68.1	77.6	13.95	88.9	14.56	14.26
TOTAL	426.8	428.3	0.35	488.0	13.94	6.93

TABLE 4-5. TRENDS IN BORDER TRADE: MAINE FRONTIER

EXPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	137	132	-3.65	144	9.09	2.52
Minerals/ Metals	59	65	10.17	80	23.08	16.44
Chemicals/ Plastics	81	89	9.88	101	13.48	11.67
Wood/Paper/ Pulp	148	168	13.51	168	0.00	6.54
Machinery/ Appliances	193	209	8.29	209	0.00	4.06
Vehicles	273	694	154.21	331	-52.31	10.11
Misc. Prod	66	64	-3.03	82	28.13	11.40
TOTAL	957	1,421	48.48	1,115	-21.53	7.94

IMPORTS in $ millions

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	898	909	1.22	818	-10.01	-4.56
Minerals/ Metals	253	207	-18.18	166	-19.81	-19.00
Chemicals/ Plastics	147	139	-5.44	227	63.31	24.27
Wood/Paper/ Pulp	583	491	-15.78	499	1.63	-7.48
Machinery/ Appliances	35	34	-2.86	41	20.59	8.23
Vehicles	32	28	-12.50	26	-7.14	-9.86
Misc. Prod	59	65	10.17	72	10.77	10.50
TOTAL	2,007	1,873	-6.68	1,849	-1.28	-4.02

TABLE 4-5. TRENDS IN BORDER TRADE: MAINE FRONTIER (cont'd)

EXPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	12.3	11.7	-4.88	13.0	11.11	2.81
Minerals/ Metals	5.4	5.2	-3.70	6.1	17.31	6.28
Chemicals/ Plastics	7.1	7.5	5.63	8.1	8.00	6.81
Wood/Paper/ Pulp	9.9	11.8	19.19	12.9	9.32	14.15
Machinery/ Appliances	9.8	10.3	5.10	11.4	10.68	7.85
Vehicles	5.4	6.0	11.11	6.0	0.00	5.41
Misc. Prod	5.0	5.2	4.00	6.8	30.77	16.62
TOTAL	54.9	57.7	5.10	64.3	11.44	8.22

IMPORTS shipments in 000's

Commodity Class	1990	1991	% chg 90-91	1992	% chg 91-92	ave % 90-92
Agric. Prod	52.8	52.0	-1.52	50.3	-3.27	-2.40
Minerals/ Metals	14.6	14.7	0.68	17.0	15.65	7.91
Chemicals/ Plastics	9.1	8.2	-9.89	12.0	46.34	14.83
Wood/Paper/ Pulp	35.9	35.8	-0.28	40.5	13.13	6.21
Machinery/ Appliances	1.6	1.4	-12.50	1.8	28.57	6.07
Vehicles	1.4	1.5	7.14	1.7	13.33	10.19
Misc. Prod	4.1	4.9	19.51	5.5	12.24	15.82
TOTAL	119.5	118.5	-0.84	128.8	8.69	3.82

4.3 TRENDS IN TRAFFIC

Traffic levels for the highway crossings are presented in Chapter 1 and the Profile Appendices 1-5. Motor carriers are the dominant mode for moving trade in this region; however, they are not the dominant source of demand for border crossing infrastructure. Passenger cars by far outnumber commercial vehicles, although each truck imposes a greater burden upon the FIS than does an individual passenger car.

The relative pattern of vehicle demands by border frontier are shown in Table 4-6. The 4-year average annual rate of growth in total traffic, i.e., inbound and outbound, was calculated for each frontier, for passenger and for commercial vehicles. Passenger traffic rose at 10.5 percent for the eastern border in total. Most frontiers were close to the average, except that Niagara grew 20 percent slower and Eastern New York grew 50 percent faster.

Commercial vehicle traffic grew at 7.5 percent per year for the eastern border as a whole. Thus, passenger demand was not only the most important source of traffic, it grew in relative importance over the period. Note that more recent vehicle counts indicate that in some areas, passenger demand is slowing.

Commercial traffic at most of the frontiers grew at rates close to the eastern average. Niagara, however, grew nearly 40 percent slower rate and Montreal South grew nearly 80 percent faster. Thus, the overall rate of growth in traffic for Niagara also fell below the eastern regional average of 10.2 percent.

TABLE 4-6. TRENDS IN TRAFFIC BY FRONTIER
average annual rate of increase
based on two way traffic

1989 to 1992

FRONTIER	Passenger Vehicles	Commercial Vehicles	Total Vehicles
Michigan	10.6 percent	07.2 percent	10.1 percent
Niagara	08.1 percent	04.7 percent	07.8 percent
Eastern NY	15.8 percent	09.8 percent	15.3 percent
Montreal South	11.9 percent	13.5 percent	12.1 percent
Maine	11.1 percent	07.8 percent	11.0 percent
TOTAL	10.5 percent	07.5 percent	10.2 percent

4.4 IMPACTS ON CURRENT TRADE AND TRAFFIC PATTERNS

In order to estimate the level of demand likely to be imposed on the system, the current trends have been extrapolated out five years (to 1997). The trends discussed in Section 4.2 and those of Section 4.3 provide alternative bases for projecting traffic levels in the future. The results of these alternative extrapolations are shown in Table 4-7.

TABLE 4-7. COMPARISON OF TRADE AND TRAFFIC GROWTH RATES

Frontier	Five Year Forecast: 000's of Commercial Vehicles (and as a percentage of Passenger Vehicles)			
	Passenger	Commercial Vehicles based on trend in		
		Traffic	Trade	Shipments
Michigan	31170	3682 (11.8%)	3477 (11.2%)	4180 (13.4%)
Niagara	18990	1703 (9.0%)	2233 (11.8%)	2181 (11.5%)
Eastern NY	11363	519 (4.6%)	642 (5.6%)	555 (4.9%)
Montreal S	12765	1199 (9.4%)	1230 (9.6%)	1166 (9.1%)
Maine	17287	730 (4.2%)	759 (4.4%)	855 (4.9%)
TOTAL	91576	7833 (8.6%)	8218 (9.0%)	8937 (9.8%)

For this comparison, passenger levels were extrapolated from the 1992 levels to 1997 by using the passenger average annual rate calculated from the 1990 to 1992 data. These rates were applied to the frontier total passenger counts as of 1992. The individual growth rates are calculated directly from the data, shown in technical appendix 4. Overall passenger traffic is projected to increase at a rate of 6.2 percent per year. This is a weighted average of the frontier rates.

The commercial traffic levels were calculated using three rates of growth. The first applies the observed 1990 to 1992 annual average rate of growth in commercial traffic at each frontier to that frontier's 1992 actual count. Thus, these are calculated as the passenger traffic had been. The rates of growth shown for each frontier are derived directly from the data, shown in technical appendix 5. When applied to the 1992 commercial traffic levels, the 1997 levels are estimated. Overall, the total eastern border traffic is estimated to be 7.8 million vehicles, as compared to the 1992 figure of 6.4 million. This is an annual growth of 4.0 percent.

The projections based upon trade data applied the rates of growth in trade to generate a

forecast of trade levels.[4] The estimate for the total eastern border in 1997 is estimated to be approximately $160 billion. The frontier by frontier total rate of growth in trade was applied to the 1992 frontier commercial traffic levels to yield estimated traffic for 1997. The resulting total traffic level is 8.3 million commercial vehicles, equivalent to an average annual rate of growth of 5.3 percent.

The third projection of commercial traffic used the commodity specific rates of growth in shipments for each frontier to generate 1997 estimates of shipments by frontier in a method comparable to that for the trade based projections. The total frontier growth rate was applied to the frontier's 1992 commercial traffic level to calculate 1997 levels. The result is an estimate of commercial traffic of 8.9 million vehicles. This is an average growth of 6.8 percent per year.

Under no projection does commercial traffic become large vis-a-vis passenger traffic. In the lowest growth case, commercial traffic is 8.6 percent of passenger traffic by 1997. In the highest growth case, it becomes 9.8 percent. Thus, from the point of view of demands upon crossing facilities, passenger travel becomes relatively more important in two of the three cases.

[4]These projected levels were calculated as follows. Tables 4-1 to 4-5 show both the 1992 levels of trade and shipments by commodity class and by frontier. They also give the average rate of growth by commodity and frontier. For both trade and shipments, the average rate of growth was used to project trade and shipments in each commodity class in each frontier out to 1997. The 1997 levels were then summed across all commodity classes within a frontier and compared to the corresponding 1992 levels summed across commodity classes. The ratio of 1997 to 1992 level, shown in technical appendices 6 and 7, was then applied to the 1992 levels of two way traffic in each frontier to get an estimate of the 1997 level of traffic in each frontier.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY

The following is a summary of the characteristics of trade and traffic between the U.S. and Canada, with an emphasis on Eastern border crossings.

General Trade Picture

- Canada is the largest trading partner of the U.S.. In 1992, total trade was over $188 billion.
- Overall, the U.S. runs a negative trade balance with Canada. In 1992, this was more than $8 billion.
- Manufactured goods are the most important commodity classes in dollar terms in the trade with Canada. For these commodities, the U.S. runs a favorable trade balance, on average.
- Trade between the two countries is mainly by land. Land modes, principally, highways and rail, account for 88 percent of the flow when measured in value terms.
- The trade is concentrated among states and provinces. Seven states and two provinces account for over half of the trade.
- The most active trading states are in the midwest and Mid-Atlantic regions. California is the major exception to the generalization. To a lesser extent, Texas and Washington are also exceptions.

The Eastern Trade Picture

- Transportation routes cross primarily in east. Nearly 60 percent, by value, passes through just three ports: Detroit, Buffalo-Niagara, and Port Huron.
- In the East, manufactured goods are the most important commodity classes. On average, the U.S. has a favorable trade balance in these commodities. The U.S. also has a favorable trade balance in chemicals and plastics, as a group. Canada has a favorable balance of trade in minerals and metals and wood/paper/pulp. For the other major commodity classes evaluated, trade is fairly balanced.

The Traffic Picture

- Passenger vehicle traffic dominates the flows at all ports. For the eastern crossings, on average more than 91 percent of the traffic count is automobiles.
- From 1989 to 1992, total traffic grew by 33.9 percent; automobile traffic grew by 35.0 percent; and commercial traffic by 24.2 percent.
- Automobile traffic is more volatile than commercial traffic.
- Recent traffic counts are down along the U.S.-Canadian border in both the east and the west. This is a result of reduced cross border shopping.
- There is a large volume of traffic that is not local and not associated with U.S.-Canada trade. There are Canada to Canada movements passing through the U.S. and U.S. to U.S. movements going through Canada. There is also commercial traffic associated with non-North American trade moving between the Midwest and Canadian ports, such as Montreal and Halifax.
- Rail traffic is down as a result of the recession.
- Waterborne traffic has also been falling.
- Air cargo, on the other hand, has been growing rapidly.

Trade Corridors

- There are very few trade corridors in the sense that there is a continuous, linear, set of communities or states all of which are trading through a given frontier.
- Trade flows, for the most part are local or intraregional flows.
- There are a limited number of interregional flows. For these, California is the most important origin or destination state.

5.2 CONCLUSIONS AND RECOMMENDATIONS

5.2.1 Border Infrastructure Needs

This discussion will use the segmentation of the transportation infrastructure supporting U.S.-Canada trade of: a) border crossings, b) crossing plazas, c) crossing access, and d) 'trade corridor' infrastructure. Each segment will be discussed below.

5.2.1.1 Border Crossings - Most of the eastern border crossing are bridges and tunnels crossing navigable waterways. These facilities are costly to construct and planning process is likewise long and costly. Current and planned the border crossings between the U.S. and Canada are adequate, in large part, to handle current traffic and future traffic levels. State, provincial, local, and crossing authority officials have identified the current constraints and most likely future constraints. In most cases, plans for addressing the problems are in place. Significant improvements are currently underway and many of these are referenced in the border crossing inventories. Implementation of other aspects of existing plans are subject to governmental approvals and financing.

One capability currently lacking in the Michigan frontier is the ability to move double stack trains between Michigan and Ontario. Plans for constructing a double stack rail tunnel at Port Huron-Sarnia are awaiting final approval. (This tunnel was subsequently approved, and construction has begun.) This capability has created substantial local and national interest. At the local level, there is competition between Detroit and Port Huron for double stack capability. This appears to be purely a local issue that can be resolved by the local stakeholders and railroads. At the national level, double stack capability through the Michigan frontier is viewed as a threat to U.S. east coast ports. Double stack capability at the Michigan frontier will make it easier for Midwest shippers to use Montreal and Halifax to access Europe. If this occurs there will be reduced shipments to the east coast ports, other things being equal. National interests, however, will be best served by providing the lowest cost transportation routes to shippers and consumers.

5.2.1.2 Crossing Plazas - If capacity is constrained at border crossings because of physical infrastructure, it is most likely a result of inadequate plaza capacity or design. Border crossing locations often limit the options for designing plazas. However, even when the site is not constrained, the plaza designs and traffic patterns may serve the efficient flow of traffic poorly. To a large extent this is a result of attempting to carry on several different types of inspections and clearance activities in a single location.

Some locations have moved parts of the inspection and clearance procedures off the plaza, thereby improving the flow of traffic. The Federal Inspection Services, GSA, and state/provincial, local and national transportation officials should investigate which functions must remain at the border and which functions could be moved off-plaza.

5.2.1.3 Local Access - Access to the border crossings was the most common infrastructure need cited by participants in the outreach activities. Other studies and inspections confirm the importance of this issue.

For many crossings in the East where bridges and tunnels are tolled, direct access from the interstate systems had been precluded by legislation. As a result the local communities were left with providing adequate linkages. Without cost sharing incentives, MPO's paid too little attention to the needs of the border crossings. Local communities have paid the cost, however, in other ways, through congestion of local streets, air pollution, and higher costs for police and emergency services.

The ISTEA permits the use of federal funds to close the gap between the national

transportation networks and the border crossings, encourages funding intermodal links, and imposes upon MPO's the responsibility of serving the border crossings. The Federal Government can further encourage improvements to border crossing access infrastructure by bringing the international trade community into the planning process. A more formal approach would be the implementation of new funding options for border infrastructure. This could include a discretionary program or the creation of revolving loan funds or border development banks.

5.2.1.4 Corridor Infrastructure - There are corridor links on the existing national networks overburden by current traffic. Those links near border crossings have relatively high percentage of international trade traffic. Although, the international traffic is not the sole source of the congestion, the incremental impact of international traffic may be significant. Improvements to these links should be considered in addressing the access problems discussed previously. Trade corridors are discussed in more generally below.

5.2.2 Financing

Local and state/provincial officials are aware of current needs and often have effective plans for meeting those needs, but needs remain, largely due to the lack of available fundiing.

Improvements typically come from local funds (or out of allocations to localities), but the benefits to the improvements often accrue to firms, carriers, shippers, in communities not paying for the improvements. Thus, the incentives to the local decision makers have not been strong enough to result in needed investments.

ISTEA changed some of the ground rules. Federal funds can be used for tolled facilities, and private/public partnerships are encouraged. As a result, more effective use of user charges is feasible. Revenues so raised can be used to fund improvements or payoff incurred debt secured by the revenue streams. Since users would pay for the improvements, the cost burden will fall upon the beneficiaries, overcoming the cause of under-investment.

5.2.3 Institutional Impediments

The Section 6015 Outreach activities revealed a consensus among the participants that institutional factors are the major barrier to smooth effective movement of trade and traffic. This confirms the results of previous studies, and discussions and observations at the border crossing. The concerns fell into four categories discussed below.

5.2.3.1 Coordination among Federal Inspection Services - Federal Inspection Services, primarily U.S. Customs Service and Immigration and Naturalization Service, but also USDA, FDA, and the law enforcement agencies, do not have consistent operating practices from crossing to crossing within a given service or among the services. Overlapping management and objectives that are not established in coordination with other services lead to

inefficient inspection and clearance procedures. The lack of a clear secondary objective of facilitating traffic in the accomplishment of the primary objectives was noted in several meetings.

The Department of Transportation can represent the transportation community's interest in a comprehensive evaluation of the missions of the FIS. The Free Trade Agreement has altered some FIS responsibilities. NAFTA would change them further. This is an appropriate time to reassess the role of the FIS along the North American borders.

Consolidation of the primary inspection services into a single agency would also improve the performance of the Customs and INS in fulfilling their current or revised missions. This would eliminate duplicate management structures and internalize the coordination so needed between the two agencies.

5.2.3.2 Staffing Issues - Staffing of the border facilities by Customs and INS has constrained the capacity of the facilities to below that supportable by the physical infrastructure. The two agencies have staffed to different levels even though they have comparable responsibilities for primary inspections. The allocations of staff port by port differ between the two, and operating practices and the amount of cooperation between the two agencies also varies port by port.

There are current proposals to reduce the number of Customs inspectors nationwide and to reallocate remaining resources from the northern border to the southwest. In the absence of any innovative actions to offset the consequences of these actions, reducing Customs staff will limit further the most binding constraint at many borders and unnecessarily pit northern interests against southwestern interests.

The FIS should be permitted to respond to changing circumstances, including increasing demand for entry into the U.S., in a more market driven fashion. This could include:

- Management of staff to meet demand. Rather than operate under billet restrictions, the FIS should be permitted to hire sufficient staff to meet crossing demands. The use of part time and other-than-full-time permanent employees could be expanded. Funding could come from user charge fees paid by those crossing the border. Not all border crossings would need to impose user fees, and the level of user fees could vary by the conditions at a particular crossing. Crossing could establish different levels of service and impose higher charges for the premium service. Shippers and carriers should be permitted to fund extra positions dedicated to serving their particular needs. There are precedents for this in the clearance of aviation and maritime shipments.

- Use Contract or Private Inspectors. Not all inspection and clearance functions need to be performed by federal agents. The FIS should be permitted to use contract inspectors and support staff, trained to meet FIS standards and operating under FIS review. Some of the clearance functions could be

performed off site by the contract/private inspectors.

- Joint Staffing. Joint staffing, where possible, has the advantage of reducing the combined U.S.-Canadian staffing needed at a crossing. It also reduces the investment in border crossing facilities such as office and secondary inspection buildings. In some locations, joint staffing by U.S. and Canadian agents is now used. Additional locations for which this is possible should be identified.

5.2.3.3 Modernization of Inspection Procedures - The FIS have implemented changes to the inspection and clearance process made possible by newer technologies. However, these could be pursued more aggressively. The FIS would be helped in this process by having funding for demonstration programs.

Passage of the Customs Modernization and Informed Compliance Bill would ratify some of the improved processes already in place and permit greater use of existing technologies to improve FIS operations. (This Act was subsequently passed.)

5.2.3.4 Brokers - Brokers play a critical role in the smooth transit of trade between the two countries. The current responsibilities assumed by brokers is largely a function of earlier trade practices. Changing technologies and information systems may have outdated some of the role of brokers. There should be an assessment of what current brokerage functions are no longer critical, what new roles brokers could assume, and what changes in how brokers provide their services would improve the flow of trade and traffic. At a very practical level, increasing the hours of broker operation would increase throughput capacity.

5.3.4 Corridors

One of the study objectives was to identify existing and emerging corridors. The assessment of current and future trade patterns leads to the conclusion that there are three basic types of trading relationships associated with the flow of trade traffic through a port. These are discussed below.

5.3.4.1 Intra-Regional Trade and Traffic - The most common trade and traffic patterns observed were of this type. A large amount of traffic is very local and associated with commuting and cross border shopping. This is because the border communities are very interdependent and function as a single economic entity, much like twin cities in the U.S. or Canada. These patterns can be generalized to broader economic regions that include several states and provinces, and these are the most appropriate unit of analysis when assessing the transportation needs linked to trade and traffic flows.

The transportation requirements to serve international trade for most of the trade patterns observed are for rich regional networks rather than transportation corridors. Of course,

transportation infrastructure is provided in terms of links and nodes. Thus, it is important to consider improvement in a particular link in relationship to the current and desired regional network. In addition, since the overall transportation trip is relatively short, problems in accessing the regional networks impose a large penalty, in terms of the percent increase in transportation cost, to the region's ability to produce products competitively.

The dominance of intra-regional flows may be differentially important to the East because of the density of both the Canadian and U.S. populations and production capacities in the East. However, the importance of local traffic would appear to be similar to many of the flows on the southwestern border.

5.3.4.2 Inter-Regional Trade and Traffic - Several origins and destinations outside of the eastern study area are important to the trade and traffic flows through the eastern border crossings. The most important is California and secondarily Texas. Washington and Alberta are also relatively important factors in the eastern crossings.

The transportation needs associated with these flows are far different than those for intra-regional trade. The most important incremental investments would be to the line haul portion of the move. However, this trade traffic is a small part of total traffic on the cross continental routes, improvements should be made based on meeting the needs of domestic moves. Access to and from the border crossings is not as critical to shippers and carriers, since it represents a small portion of the overall transportation cost.

5.3.4.3 Trade Corridors - The analysis did identify several trade patterns that penetrated more deeply into the nation and for which there was substantial trading activity from the intervening states as well. These patterns correspond most closely to the intuitive understanding of a trade corridor. The good examples of these are Ontario-Michigan-and west toward Missouri, Ontario-Michigan-and south toward Tennessee, Ontario-Niagara-and southeast toward North Carolina, and Quebec-Montreal South-and south to the southeast.

For these corridors, the transportation requirements may be to have multiple, somewhat parallel line haul segments. However, the international trade will only be a small portion of total traffic through these corridors, and improvements should be made based upon the combination of domestic and international demand.

In summary, the corridor concept may not be the most effective way of thinking about transportation needs related to trade and traffic. Although there are incremental line haul improvements that would improve the flow of international trade, it is very unlikely that any such improvement could be justified solely on the basis of international trade.

Attempts to define long-distance corridor coalitions to encourage economic development can be helpful in establishing broad regional planning and prioritizing of needs. However, they are unlikely to be able to identify any new bi-national trade flows that will be created by investments in new or upgraded corridor segments of the current national networks. None of the outreach efforts identified latent trade demand that has not been realized because of a

lack of infrastructure. Thus new corridors would most likely simply relocate economic activity from one region to another.

5.3.5 Trade Data Improvements

Policy makers, planners, and the private sector are seriously hampered by inadequate trade and transportation data on North American flows. Trade statistics appear to be designed for accounting purposes rather than analytical uses, and transportation considerations are low in the design of the databases. Roundtable participants also expressed concern about the timeliness of the data.

The Federal Government should develop a data program that can provide the information needed for policy, planning and the private sector. The Department of Transportation should initiate an investigation into the needs, and the most effective methods of collecting, maintaining, and disseminating the information.

The U.S. Bureau of the Census is responsive to customer demands and could take the lead role in maintaining the necessary information. However, to the extent that overall Census staffing constraints will not enable transportation related trade and traffic considerations a major driving force, alternatives should be investigated. These alternatives should include the Bureau of Transportation Statistics or a consortium of the DOT and the private sector.

As a first step in the process, the Department should continue to exploit the data amassed in the Section 6015 study and determine ways of integrating the various data sources so as to make the information available to the public in a user friendly format.

The Department of Transportation should also encourage the continuation of discussions among planners and officials of the three North American trading partners. The objective should be to develop ongoing data interchange programs useful in all three countries.

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TA. TECHNICAL APPENDICES

TA.0 INTRODUCTION

Technical Appendices 1 and 2

The following technical appendices provide added detail to the discussions in the body of the report. Technical Appendices 1 and 2 contain a more complete description of the grouping of commodities as classified under the harmonized system and the broad groups used for analysis in the study. In addition, more complete descriptions of the levels of trade for 1992 are provided. The two appendices differ only in that Technical Appendix 1 contains data on exports to Canada and Technical Appendix 2 contains data on imports from Canada. In each, the first column gives the commodity classification used in the study, column two gives a complete listings of the 2-digit harmonized classes contained in the study grouping, column three provides a short description of the 2-digit harmonized code, and column four gives the dollar value of trade for each of the 2-digit classes for 1992.

Technical Appendix 3

The third technical appendix provides a listing of Customs facilities that was used to develop the border groups and gateways described in the study. The first column is the U.S. Customs District, the second is the Customs code for the specific port, and column three gives the location of the port. The indexing in the remaining columns was developed for this study and only for ports along the U.S.-Canada border. Column four shows the border groups described in the report, and column five shows the border groups further aggregated into border regions or frontiers as discussed in the study. The sixth column divides the U.S.-Canada gateways east and west. The last column shows the Canadian Province associated with each port.

Technical Appendices 4 and 5

These appendices contain the underlying data for projecting passenger and commercial traffic based upon historic traffic levels. The projections are contained in Table 4-7.

Technical Appendices 6 and 7

These appendices contain the frontier level projections of trade by value and by shipments used to project traffic levels by frontier. See Table 4-7 and Footnote 4 associated with the table.

TA.1 TECHNICAL APPENDIX 1
STUDY COMMODITY CLASSIFICATION AND COMPONENTS
1992 EXPORTS TO CANADA

Commodity Group Name	Commodity (HS 2 digit)	US Dollar Value
AGRICULTURAL	08 EDIBLE FRUIT & NUTS; CITRUS FRUIT O	$ 1,111,600,430
AGRICULTURAL	07 EDIBLE VEGETABLES & CERTAIN ROOTS &	$ 764,668,576
AGRICULTURAL	02 MEAT AND EDIBLE MEAT OFFAL	$ 467,382,829
AGRICULTURAL	20 PREP VEGETABLES, FRUIT, NUTS OR OTH	$ 458,341,974
AGRICULTURAL	23 FOOD INDUSTRY RESIDUES & WASTE; PRE	$ 412,454,199
AGRICULTURAL	19 PREP CEREAL, FLOUR, STARCH OR MILK;	$ 354,800,873
AGRICULTURAL	21 MISCELLANEOUS EDIBLE PREPARATIONS	$ 317,010,877
AGRICULTURAL	03 FISH, CRUSTACEANS & AQUATIC INVERTE	$ 295,403,558
AGRICULTURAL	16 EDIBLE PREPARATIONS OF MEAT, FISH,	$ 183,216,126
AGRICULTURAL	18 COCOA AND COCOA PREPARATIONS	$ 166,882,725
AGRICULTURAL	12 OIL SEEDS ETC.; MISC GRAIN, SEED, F	$ 166,557,446
AGRICULTURAL	10 CEREALS	$ 159,855,080
AGRICULTURAL	17 SUGARS AND SUGAR CONFECTIONARY	$ 150,682,346
AGRICULTURAL	22 BEVERAGES, SPIRITS AND VINEGAR	$ 137,459,044
AGRICULTURAL	09 COFFEE, TEA, MATE & SPICES	$ 136,635,537
AGRICULTURAL	06 LIVE TREES, PLANTS, BULBS ETC.; CUT	$ 116,812,746
AGRICULTURAL	01 LIVE ANIMALS	$ 113,658,898
AGRICULTURAL	15 ANIMAL OR VEGETABLE FATS, OILS ETC.	$ 111,010,096
AGRICULTURAL	04 DAIRY PRODS; BIRDS EGGS; HONEY; ED	$ 61,198,037
AGRICULTURAL	11 MILLING PRODUCTS; MALT; STARCH; INU	$ 38,363,260
AGRICULTURAL	05 PRODUCTS OF ANIMAL ORIGIN, NESOI	$ 33,794,823
AGRICULTURAL	24 TOBACCO AND MANUFACTURED TOBACCO SU	$ 20,810,125
AGRICULTURAL	13 LAC; GUMS, RESINS & OTHER VEGETABLE	$ 14,226,204
AGRICULTURAL	14 VEGETABLE PLAITING MATERIALS & PROD	$ 3,650,256
	Total for Agricultural	$ 5,796,476,065
MINERALS AND METALS	73 ARTICLES OF IRON OR STEEL	$ 1,828,944,384
MINERALS AND METALS	27 MINERAL FUEL, OIL ETC.; BITUMIN SUB	$ 1,371,532,363
MINERALS AND METALS	76 ALUMINUM AND ARTICLES THEREOF	$ 1,092,715,180
MINERALS AND METALS	72 IRON AND STEEL	$ 1,045,429,097
MINERALS AND METALS	83 MISCELLANEOUS ARTICLES OF BASE META	$ 574,282,501
MINERALS AND METALS	82 TOOLS, CUTLERY ETC. OF BASE METAL &	$ 486,073,120
MINERALS AND METALS	26 ORES, SLAG AND ASH	$ 434,946,912
MINERALS AND METALS	74 COPPER AND ARTICLES THEREOF	$ 382,697,111
MINERALS AND METALS	25 SALT; SULFUR; EARTH & STONE; LIME &	$ 286,099,407
MINERALS AND METALS	81 BASE METALS NESOI; CERMETS; ARTICLE	$ 84,962,760
MINERALS AND METALS	75 NICKEL AND ARTICLES THEREOF	$ 63,399,919
MINERALS AND METALS	80 TIN AND ARTICLES THEREOF	$ 27,076,189
MINERALS AND METALS	79 ZINC AND ARTICLES THEREOF	$ 20,614,672
MINERALS AND METALS	78 LEAD AND ARTICLES THEREOF	$ 16,464,054
	Total for Minerals and Metals	$ 7,715,237,669
CHEMICALS/PLASTICS	39 PLASTICS AND ARTICLES THEREOF	$ 3,156,282,299
CHEMICALS/PLASTICS	40 RUBBER AND ARTICLES THEREOF	$ 1,319,423,858
CHEMICALS/PLASTICS	29 ORGANIC CHEMICALS	$ 1,191,462,712
CHEMICALS/PLASTICS	38 MISCELLANEOUS CHEMICAL PRODUCTS	$ 1,080,877,126
CHEMICALS/PLASTICS	30 PHARMACEUTICAL PRODUCTS	$ 685,228,609
CHEMICALS/PLASTICS	28 INORG CHEM; PREC & RARE-EARTH MET &	$ 654,948,963
CHEMICALS/PLASTICS	32 TANNING & DYE EXT ETC; DYE, PAINT,	$ 528,071,911
CHEMICALS/PLASTICS	37 PHOTOGRAPHIC OR CINEMATOGRAPHIC GOO	$ 377,124,918
CHEMICALS/PLASTICS	33 ESSENTIAL OILS ETC; PERFUMERY, COSM	$ 376,435,999
CHEMICALS/PLASTICS	34 SOAP ETC; WAXES, POLISH ETC; CANDLE	$ 351,031,020
CHEMICALS/PLASTICS	31 FERTILIZERS	$ 197,866,635
CHEMICALS/PLASTICS	35 ALBUMINOIDAL SUBST; MODIFIED STARCH	$ 157,986,785
CHEMICALS/PLASTICS	36 EXPLOSIVES; PYROTECHNICS; MATCHES;	$ 58,664,464
	Total for Chemicals/Plastics	$10,135,405,299

Commodity Group Name	Commodity (HS 2 digit)	US Dollar Value
WOOD/PAPER/PULP	48 PAPER & PAPERBOARD & ARTICLES (INC	$ 1,695,901,041
WOOD/PAPER/PULP	49 PRINTED BOOKS, NEWSPAPERS ETC; MANU	$ 1,654,883,171
WOOD/PAPER/PULP	44 WOOD AND ARTICLES OF WOOD; WOOD CHA	$ 1,034,302,921
WOOD/PAPER/PULP	47 PULP OF WOOD ETC; WASTE ETC OF PAPE	$ 277,911,169
WOOD/PAPER/PULP	45 CORK AND ARTICLES OF CORK	$ 8,949,859
WOOD/PAPER/PULP	46 MFR OF STRAW, ESPARTO ETC.; BASKETW	$ 3,469,198
	Total for Wood/Paper/Pulp	$ 4,675,417,359
MACHINERY/MACHINERY APPL	84 NUCLEAR REACTORS, BOILERS, MACHINER	$17,385,596,661
MACHINERY/MACHINERY APPL	85 ELECTRIC MACHINERY ETC; SOUND EQUIP	$11,225,248,904
	Total for Machinery/Machinery Appliances	$28,610,845,565
VEHICLES	87 VEHICLES, EXCEPT RAILWAY OR TRAMWAY	$18,398,633,349
VEHICLES	90 OPTIC, PHOTO ETC, MEDIC OR SURGICAL	$ 2,909,715,199
VEHICLES	88 AIRCRAFT, SPACECRAFT, AND PARTS THE	$ 1,493,590,338
VEHICLES	94 FURNITURE; BEDDING ETC; LAMPS NESOI	$ 1,378,272,337
VEHICLES	95 TOYS, GAMES & SPORT EQUIPMENT; PART	$ 590,951,043
VEHICLES	93 ARMS AND AMMUNITION; PARTS AND ACCE	$ 208,173,809
VEHICLES	86 RAILWAY OR TRAMWAY STOCK ETC; TRAFF	$ 193,065,047
VEHICLES	96 MISCELLANEOUS MANUFACTURED ARTICLES	$ 168,349,777
VEHICLES	89 SHIPS, BOATS AND FLOATING STRUCTURE	$ 152,856,059
VEHICLES	91 CLOCKS AND WATCHES AND PARTS THEREO	$ 75,506,251
VEHICLES	97 WORKS OF ART, COLLECTORS' PIECES AN	$ 49,878,336
VEHICLES	92 MUSICAL INSTRUMENTS; PARTS AND ACCE	$ 39,094,051
	Total for Vehicles	$25,658,085,596
MISCELLANEOUS	98 SPECIAL CLASSIFICATION PROVISIONS,	$ 3,357,919,980
MISCELLANEOUS	70 GLASS AND GLASSWARE	$ 781,088,796
MISCELLANEOUS	71 NAT ETC PEARLS, PREC ETC STONES, PR	$ 763,240,617
MISCELLANEOUS	54 MANMADE FILAMENTS, INCLUDING YARNS	$ 301,638,211
MISCELLANEOUS	68 ART OF STONE, PLASTER, CEMENT, ASBE	$ 242,521,142
MISCELLANEOUS	57 CARPETS AND OTHER TEXTILE FLOOR COV	$ 232,233,660
MISCELLANEOUS	59 IMPREGNATED ETC TEXT FABRICS; TEX A	$ 214,023,197
MISCELLANEOUS	52 COTTON, INCLUDING YARN AND WOVEN FA	$ 207,251,704
MISCELLANEOUS	55 MANMADE STAPLE FIBERS, INCL YARNS &	$ 187,096,772
MISCELLANEOUS	69 CERAMIC PRODUCTS	$ 174,240,954
MISCELLANEOUS	56 WADDING, FELT ETC; SP YARN; TWINE,	$ 154,080,707
MISCELLANEOUS	61 APPAREL ARTICLES AND ACCESSORIES, K	$ 147,745,053
MISCELLANEOUS	63 TEXTILE ART NESOI; NEEDLECRAFT SETS	$ 142,475,750
MISCELLANEOUS	62 APPAREL ARTICLES AND ACCESSORIES, N	$ 136,117,237
MISCELLANEOUS	41 RAW HIDES AND SKINS (NO FURSKINS) A	$ 104,632,303
MISCELLANEOUS	60 KNITTED OR CROCHETED FABRICS	$ 98,408,822
MISCELLANEOUS	64 FOOTWEAR, GAITERS ETC. AND PARTS TH	$ 95,451,375
MISCELLANEOUS	42 LEATHER ART; SADDLERY ETC; HANDBAGS	$ 62,659,460
MISCELLANEOUS	58 SPEC WOV FABRICS; TUFTED FAB; LACE;	$ 52,850,907
MISCELLANEOUS	43 FURSKINS AND ARTIFICIAL FUR; MANUFA	$ 41,927,441
MISCELLANEOUS	65 HEADGEAR AND PARTS THEREOF	$ 29,288,365
MISCELLANEOUS	51 WOOL & ANIMAL HAIR, INCLUDING YARN	$ 18,506,072
MISCELLANEOUS	67 PREP FEATHERS, DOWN ETC; ARTIF FLOW	$ 5,940,538
MISCELLANEOUS	53 VEG TEXT FIB NESOI; VEG FIB & PAPER	$ 4,535,059
MISCELLANEOUS	50 SILK, INCLUDING YARNS AND WOVEN FAB	$ 3,732,257
MISCELLANEOUS	66 UMBRELLAS, WALKING-STICKS, RIDING-C	$ 3,435,161
MISCELLANEOUS	99 SPECIAL IMPORT PROVISIONS, NESOI	$
	Total for Miscellaneous	$ 7,563,041,540

TA.2 TECHNICAL APPENDIX 2
STUDY COMMODITY CLASSIFICATION AND COMPONENTS
1992 IMPORTS FROM CANADA

Commodity Group Name	Commodity (HS 2 digit)	US Dollar Value
AGRICULTURAL	01 LIVE ANIMALS	$ 1,019,416,338
AGRICULTURAL	03 FISH, CRUSTACEANS & AQUATIC INVERTE	$ 1,010,717,971
AGRICULTURAL	02 MEAT AND EDIBLE MEAT OFFAL	$ 632,392,830
AGRICULTURAL	22 BEVERAGES, SPIRITS AND VINEGAR	$ 595,175,429
AGRICULTURAL	10 CEREALS	$ 326,320,246
AGRICULTURAL	24 TOBACCO AND MANUFACTURED TOBACCO SU	$ 296,477,100
AGRICULTURAL	19 PREP CEREAL, FLOUR, STARCH OR MILK;	$ 260,066,809
AGRICULTURAL	23 FOOD INDUSTRY RESIDUES & WASTE; PRE	$ 235,384,526
AGRICULTURAL	17 SUGARS AND SUGAR CONFECTIONARY	$ 203,741,114
AGRICULTURAL	15 ANIMAL OR VEGETABLE FATS, OILS ETC.	$ 176,665,800
AGRICULTURAL	21 MISCELLANEOUS EDIBLE PREPARATIONS	$ 172,178,790
AGRICULTURAL	18 COCOA AND COCOA PREPARATIONS	$ 151,174,554
AGRICULTURAL	16 EDIBLE PREPARATIONS OF MEAT, FISH,	$ 146,131,960
AGRICULTURAL	12 OIL SEEDS ETC.; MISC GRAIN, SEED, F	$ 122,018,695
AGRICULTURAL	07 EDIBLE VEGETABLES & CERTAIN ROOTS &	$ 116,614,756
AGRICULTURAL	20 PREP VEGETABLES, FRUIT, NUTS OR OTH	$ 93,890,149
AGRICULTURAL	06 LIVE TREES, PLANTS, BULBS ETC.; CUT	$ 87,127,577
AGRICULTURAL	08 EDIBLE FRUIT & NUTS; CITRUS FRUIT O	$ 64,910,358
AGRICULTURAL	11 MILLING PRODUCTS; MALT; STARCH; INU	$ 49,243,993
AGRICULTURAL	04 DAIRY PRODS; BIRDS EGGS; HONEY; ED	$ 39,950,101
AGRICULTURAL	05 PRODUCTS OF ANIMAL ORIGIN, NESOI	$ 19,149,990
AGRICULTURAL	09 COFFEE, TEA, MATE & SPICES	$ 7,547,900
AGRICULTURAL	13 LAC; GUMS, RESINS & OTHER VEGETABLE	$ 982,047
AGRICULTURAL	14 VEGETABLE PLAITING MATERIALS & PROD	$ 31,259
	Total for Agricultural	$ 5,827,310,292
MINERALS AND METALS	27 MINERAL FUEL, OIL ETC.; BITUMIN SUB	$10,586,138,267
MINERALS AND METALS	76 ALUMINUM AND ARTICLES THEREOF	$ 2,122,701,152
MINERALS AND METALS	72 IRON AND STEEL	$ 1,672,000,035
MINERALS AND METALS	73 ARTICLES OF IRON OR STEEL	$ 1,250,357,985
MINERALS AND METALS	74 COPPER AND ARTICLES THEREOF	$ 789,839,433
MINERALS AND METALS	79 ZINC AND ARTICLES THEREOF	$ 555,030,218
MINERALS AND METALS	26 ORES, SLAG AND ASH	$ 504,666,283
MINERALS AND METALS	75 NICKEL AND ARTICLES THEREOF	$ 462,905,779
MINERALS AND METALS	25 SALT; SULFUR; EARTH & STONE; LIME &	$ 361,763,548
MINERALS AND METALS	83 MISCELLANEOUS ARTICLES OF BASE META	$ 225,430,856
MINERALS AND METALS	82 TOOLS, CUTLERY ETC. OF BASE METAL &	$ 100,254,152
MINERALS AND METALS	78 LEAD AND ARTICLES THEREOF	$ 74,478,109
MINERALS AND METALS	81 BASE METALS NESOI; CERMETS; ARTICLE	$ 72,305,300
MINERALS AND METALS	80 TIN AND ARTICLES THEREOF	$ 6,818,352
	Total for Minerals and Metals	$18,784,689,469
CHEMICALS/PLASTICS	39 PLASTICS AND ARTICLES THEREOF	$ 1,863,678,178
CHEMICALS/PLASTICS	40 RUBBER AND ARTICLES THEREOF	$ 1,255,653,369
CHEMICALS/PLASTICS	28 INORG CHEM; PREC & RARE-EARTH MET &	$ 1,059,407,161
CHEMICALS/PLASTICS	29 ORGANIC CHEMICALS	$ 839,698,607
CHEMICALS/PLASTICS	31 FERTILIZERS	$ 762,554,507
CHEMICALS/PLASTICS	38 MISCELLANEOUS CHEMICAL PRODUCTS	$ 279,476,181
CHEMICALS/PLASTICS	37 PHOTOGRAPHIC OR CINEMATOGRAPHIC GOO	$ 254,664,381
CHEMICALS/PLASTICS	32 TANNING & DYE EXT ETC; DYE, PAINT,	$ 186,989,496
CHEMICALS/PLASTICS	30 PHARMACEUTICAL PRODUCTS	$ 170,786,584
CHEMICALS/PLASTICS	33 ESSENTIAL OILS ETC; PERFUMERY, COSM	$ 123,271,206
CHEMICALS/PLASTICS	34 SOAP ETC; WAXES, POLISH ETC; CANDLE	$ 116,686,174
CHEMICALS/PLASTICS	36 EXPLOSIVES; PYROTECHNICS; MATCHES;	$ 90,961,677
CHEMICALS/PLASTICS	35 ALBUMINOIDAL SUBST; MODIFIED STARCH	$ 42,126,685
	Total for Chemicals/Plastics	$ 7,045,954,206

Commodity Group Name	Commodity (HS 2 digit)	US Dollar Value
OOD/PAPER/PULP	48 PAPER & PAPERBOARD & ARTICLES (INC	$ 5,983,259,697
OOD/PAPER/PULP	44 WOOD AND ARTICLES OF WOOD; WOOD CHA	$ 4,478,360,635
OOD/PAPER/PULP	47 PULP OF WOOD ETC; WASTE ETC OF PAPE	$ 1,792,758,189
OOD/PAPER/PULP	49 PRINTED BOOKS, NEWSPAPERS ETC; MANU	$ 365,352,514
OOD/PAPER/PULP	46 MFR OF STRAW, ESPARTO ETC.; BASKETW	$ 382,457
OOD/PAPER/PULP	45 CORK AND ARTICLES OF CORK	$ 121,110
	Total for Wood/Paper/Pulp	$12,620,234,602
ACHINERY/MACHINERY APPL	84 NUCLEAR REACTORS, BOILERS, MACHINER	$ 7,693,188,424
ACHINERY/MACHINERY APPL	85 ELECTRIC MACHINERY ETC; SOUND EQUIP	$ 5,070,149,841
	Total for Machinery/Machinery Appliances	$12,763,338,265
EHICLES	87 VEHICLES, EXCEPT RAILWAY OR TRAMWAY	$28,300,921,412
EHICLES	88 AIRCRAFT, SPACECRAFT, AND PARTS THE	$ 1,710,522,412
EHICLES	94 FURNITURE; BEDDING ETC; LAMPS NESOI	$ 1,325,987,587
EHICLES	90 OPTIC, PHOTO ETC, MEDIC OR SURGICAL	$ 849,459,870
EHICLES	86 RAILWAY OR TRAMWAY STOCK ETC; TRAFF	$ 398,407,948
EHICLES	95 TOYS, GAMES & SPORT EQUIPMENT; PART	$ 221,828,540
EHICLES	89 SHIPS, BOATS AND FLOATING STRUCTURE	$ 150,092,397
EHICLES	96 MISCELLANEOUS MANUFACTURED ARTICLES	$ 39,970,283
EHICLES	93 ARMS AND AMMUNITION; PARTS AND ACCE	$ 38,984,119
EHICLES	97 WORKS OF ART, COLLECTORS' PIECES AN	$ 34,221,464
EHICLES	92 MUSICAL INSTRUMENTS; PARTS AND ACCE	$ 12,685,958
EHICLES	91 CLOCKS AND WATCHES AND PARTS THEREO	$ 11,468,959
	Total for Vehicles	$33,094,550,949
ISCELLANEOUS	98 SPECIAL CLASSIFICATION PROVISIONS,	$ 4,062,555,626
ISCELLANEOUS	71 NAT ETC PEARLS, PREC ETC STONES, PR	$ 1,497,969,473
ISCELLANEOUS	99 SPECIAL IMPORT PROVISIONS, NESOI	$ 899,824,553
ISCELLANEOUS	70 GLASS AND GLASSWARE	$ 282,591,491
ISCELLANEOUS	68 ART OF STONE, PLASTER, CEMENT, ASBE	$ 257,303,899
ISCELLANEOUS	62 APPAREL ARTICLES AND ACCESSORIES, N	$ 232,143,631
ISCELLANEOUS	54 MANMADE FILAMENTS, INCLUDING YARNS	$ 192,520,513
ISCELLANEOUS	55 MANMADE STAPLE FIBERS, INCL YARNS &	$ 139,176,281
ISCELLANEOUS	61 APPAREL ARTICLES AND ACCESSORIES, K	$ 132,439,941
ISCELLANEOUS	41 RAW HIDES AND SKINS (NO FURSKINS) A	$ 100,044,063
ISCELLANEOUS	59 IMPREGNATED ETC TEXT FABRICS; TEX A	$ 94,129,260
ISCELLANEOUS	43 FURSKINS AND ARTIFICIAL FUR; MANUFA	$ 64,786,923
ISCELLANEOUS	57 CARPETS AND OTHER TEXTILE FLOOR COV	$ 59,198,137
ISCELLANEOUS	64 FOOTWEAR, GAITERS ETC. AND PARTS TH	$ 50,273,043
ISCELLANEOUS	56 WADDING, FELT ETC; SP YARN; TWINE,	$ 43,349,066
ISCELLANEOUS	52 COTTON, INCLUDING YARN AND WOVEN FA	$ 41,216,570
ISCELLANEOUS	63 TEXTILE ART NESOI; NEEDLECRAFT SETS	$ 36,345,870
ISCELLANEOUS	69 CERAMIC PRODUCTS	$ 32,274,743
ISCELLANEOUS	60 KNITTED OR CROCHETED FABRICS	$ 30,234,445
ISCELLANEOUS	42 LEATHER ART; SADDLERY ETC; HANDBAGS	$ 29,171,598
ISCELLANEOUS	51 WOOL & ANIMAL HAIR, INCLUDING YARN	$ 22,236,215
ISCELLANEOUS	58 SPEC WOV FABRICS; TUFTED FAB; LACE;	$ 22,165,628
ISCELLANEOUS	65 HEADGEAR AND PARTS THEREOF	$ 21,885,988
ISCELLANEOUS	53 VEG TEXT FIB NESOI; VEG FIB & PAPER	$ 12,466,262
ISCELLANEOUS	67 PREP FEATHERS, DOWN ETC; ARTIF FLOW	$ 2,686,412
ISCELLANEOUS	66 UMBRELLAS, WALKING-STICKS, RIDING-C	$ 2,081,523
ISCELLANEOUS	50 SILK, INCLUDING YARNS AND WOVEN FAB	$ 36,706
	Total for Miscellaneous	$ 8,361,107,860

TA.3 TECHNICAL APPENDIX 3
STUDY PORT OF ENTRY CLASSIFICATION

Dist	Code	City		Border Group	Border Region	Select	Province
01	01	Portland	, ME	0100 Portland			
01	02	Bangor	, ME	0100 Portland			
01	11	Bath	, ME	0100 Portland			
01	12	Bar Harbor	, ME	0100 Portland			
01	21	Rockland	, ME	0100 Portland			
01	22	Jonesport	, ME	0100 Portland			
01	31	Portsmouth	, ME	0100 Portland			
01	32	Belfast	, ME	0100 Portland			
01	52	Searsport	, ME	0100 Portland			
01	81	Lebanon Airport	, NH	0100 Portland			
01	04	Jackman	, ME	0104 Jackman	0106 Maine	East	PQ
01	06	Houlton	, ME	0106 Houlton	0106 Maine	East	NB
01	07	Fort Fairfield	, ME	0106 Houlton	0106 Maine	East	NB
01	18	Limestone	, ME	0106 Houlton	0106 Maine	East	NB
01	27	Bridgewater	, ME	0106 Houlton	0106 Maine	East	NB
01	08	Van Buren	, ME	0109 Madawaska	0106 Maine	East	NB
01	09	Madawaska	, ME	0109 Madawaska	0106 Maine	East	NB
01	10	Fort Kent	, ME	0109 Madawaska	0106 Maine	East	NB
01	03	Eastport	, ME	0115 Calais	0106 Maine	East	NB
01	05	Vanceboro	, ME	0115 Calais	0106 Maine	East	NB
01	15	Calais	, ME	0115 Calais	0106 Maine	East	NB
02	01	St. Albans	, VT	0200 Burlington			
02	07	Burlington	, VT	0200 Burlington			
02	09	Derby Line	, VT	0209 Derby Line	0212 Montreal South	East	PQ
02	06	Beecher Falls	, VT	0211 Norton	0212 Montreal South	East	PQ
02	11	Norton	, VT	0211 Norton	0212 Montreal South	East	PQ
02	03	Richford	, VT	0212 Highgate Springs	0212 Montreal South	East	PQ
02	12	Highgate Springs	, VT	0212 Highgate Springs	0212 Montreal South	East	PQ
04	01	Boston	, MA	0400 Boston			
04	02	Springfield	, MA	0400 Boston			
04	03	Worcester	, MA	0400 Boston			
04	04	Gloucester	, MA	0400 Boston			
04	05	New Bedford	, MA	0400 Boston			
04	06	Plymouth	, MA	0400 Boston			
04	07	Fall River	, MA	0400 Boston			
04	08	Salem	, MA	0400 Boston			
04	09	Provincetown	, MA	0400 Boston			
04	10	Bridgeport	, MA	0400 Boston			
04	11	Hartford	, MA	0400 Boston			
04	12	New haven	, MA	0400 Boston			
04	13	New london	, MA	0400 Boston			
04	16	Lawrence	, MA	0400 Boston			
04	17	Logan Airport	, MA	0400 Boston			

Dist	Code	City		Border Group	Border Region	Select	Province
05	01	Newport	, RI	0500 Newport			
05	02	Providence	, RI	0500 Newport			
05	03	Mellville	, RI	0500 Newport			
06	01	Bridgeport	, CT	0600 New London			
06	02	Hartford	, CT	0600 New London			
06	03	New Haven	, CT	0600 New London			
06	04	New London	, CT	0600 New London			
07	06	Cape Vincent	, NY	0700 Clayton			
07	14	Clayton	, NY	0700 Clayton			
07	01	Ogdensburg	, NY	0701 Ogdensburg	0701 New York	East	ON
07	04	Massena	, NY	0704 Massena	0701 New York	East	ON
07	05	Fort Covington	, NY	0704 Massena	0701 New York	East	ON
07	08	Alexandria Bay	, NY	0708 Alexandria Bay	0701 New York	East	ON
07	11	Chateaugay	, NY	0711 Chateaugay-Trout River	0701 New York	East	PQ
07	15	Trout River	, NY	0711 Chateaugay-Trout River	0701 New York	East	PQ
07	12	Champlain-Rouses Pt	, NY	0712 Champlain-Rouses Pt	0212 Montreal South	East	PQ
09	03	Rochester	, NY	0900 Syracuse			
09	04	Oswego	, NY	0900 Syracuse			
09	05	Sodus Point	, NY	0900 Syracuse			
09	06	Syracuse	, NY	0900 Syracuse			
09	07	Utica	, NY	0900 Syracuse			
09	01	Buffalo-Niagara Fall	, NY	0901 Buffalo-Niagara Fall	0901 Niagara	East	ON
09	71	Tnt Skypak, Buffalo	, NY	0901 Syracuse			
10	01	New York Seaport	, NY	1000 New York Seaport			
10	02	Albany	, NY	1000 New York Seaport			
10	03	Newark	, NJ	1000 New York Seaport			
10	04	Perth Amboy	, NY	1000 New York Seaport			
10	12	JFK Airport	, NY	1000 New York Seaport			
10	69	UPS Newark	, NJ	1000 New York Seaport			
10	70	Federal Express	, NY	1000 New York Seaport			
10	71	NYACC, Jamaica	, NY	1000 New York Seaport			
10	72	DHL, Jamaica	, NY	1000 New York Seaport			
10	73	Emery Worldwide	, NY	1000 New York Seaport			
10	74	Air France (Mach Plu	, NY	1000 New York Seaport			
10	75	Dworkin/Cosell Couri	, NY	1000 New York Seaport			
10	76	Swiss Air (Skyracer)	, NY	1000 New York Seaport			
10	77	Alitalia (aliexpress	, NY	1000 New York Seaport			
10	78	Tnt Skypak, JFK	, NY	1000 New York Seaport			
10	81	Morristown Airport	, NY	1000 New York Seaport			

Dist	Code	City		Border Group	Border Region	Select	Province
11	01	Philadelphia	, PA	1100	Philadelphia		
11	02	Chester	, PA	1100	Philadelphia		
11	03	Wilmington	, DE	1100	Philadelphia		
11	04	Pittsburgh	, PA	1100	Philadelphia		
11	05	Paulsboro	, NJ	1100	Philadelphia		
11	06	Wilkes-Barre-Scrantn	, PA	1100	Philadelphia		
11	07	Camden	, NJ	1100	Philadelphia		
11	08	Philadelphia Intl Ar	, PA	1100	Philadelphia		
11	09	Harrisburg	, PA	1100	Philadelphia		
11	13	Gloucester City	, NJ	1100	Philadelphia		
11	18	Marcus Hook	, PA	1100	Philadelphia		
11	81	Abe Airport	, PA	1100	Philadelphia		
13	01	Annapolis	, MD	1300	Baltimore		
13	02	Cambridge	, MD	1300	Baltimore		
13	03	Baltimore	, MD	1300	Baltimore		
13	04	Crisfield	, MD	1300	Baltimore		
13	05	Baltimore-Washington	, MD	1300	Baltimore		
14	01	Norfolk	, VA	1400	Norfolk		
14	02	Newport News	, VA	1400	Norfolk		
14	04	Richmond-Petersburg	, VA	1400	Norfolk		
14	06	Cape Charles City	, VA	1400	Norfolk		
14	07	Reedville	, VA	1400	Norfolk		
14	08	Hopewell	, VA	1400	Norfolk		
14	09	Charleston	, WV	1400	Norfolk		
15	01	Wilmington	, NC	1500	Beaufort-Morehead		
15	02	Winston-Salem	, NC	1500	Beaufort-Morehead		
15	03	Durham	, NC	1500	Beaufort-Morehead		
15	06	Reidsville	, NC	1500	Beaufort-Morehead		
15	11	Beaufort-Morehead	, NC	1500	Beaufort-Morehead		
15	12	Charlotte	, NC	1500	Beaufort-Morehead		
16	01	Charleston	, SC	1600	Greenville-Spartenbg		
16	02	Georgetown	, SC	1600	Greenville-Spartenbg		
16	03	Greenville-Spartenbg	, SC	1600	Greenville-Spartenbg		
16	04	Columbia	, SC	1600	Greenville-Spartenbg		
17	01	Brunswick	, GA	1700	Brunswick		
17	03	Savannah	, GA	1700	Brunswick		
17	04	Atlanta	, GA	1700	Brunswick		
18	01	Tampa	, FL	1800	Tampa		
18	03	Jacksonville	, FL	1800	Tampa		
18	05	Ferdandina Beach	, FL	1800	Tampa		
18	07	Boca Grande	, FL	1800	Tampa		
18	08	Orlando	, FL	1800	Tampa		

Dist	Code	City		Border Group	Border Region	Select	Province
18	14	St. Petersburg	FL	1800	Tampa		
18	16	Port Canaveral	FL	1800	Tampa		
18	18	Panama City	FL	1800	Tampa		
18	19	Pensacola	FL	1800	Tampa		
18	21	Port Manatee	FL	1800	Tampa		
18	81	SW FL Regional Arpt	FL	1800	Tampa		
18	82	Sanford Regional Air	FL	1800	Tampa		
18	83	Sarasota-Bradenton	FL	1800	Tampa		
18	84	Daytona Beach Airpor	FL	1800	Tampa		
19	01	Mobile	AL	1900	Mobile		
19	02	Gulfport	MS	1900	Mobile		
19	03	Pascagoula	MS	1900	Mobile		
19	04	Birmingham	AL	1900	Mobile		
19	10	Huntsville	AL	1900	Mobile		
20	01	Morgan City	LA	2000	New Orleans		
20	02	New Orleans	LA	2000	New Orleans		
20	03	Little Rock	AR	2000	New Orleans		
20	04	Baton Rouge	LA	2000	New Orleans		
20	05	Port Sulphur	LA	2000	New Orleans		
20	06	Memphis	TN	2000	New Orleans		
20	07	Nashville	TN	2000	New Orleans		
20	08	Chattanooga	TN	2000	New Orleans		
20	09	Destrehan	LA	2000	New Orleans		
20	10	Gramercy	LA	2000	New Orleans		
20	11	Greenville	MS	2000	New Orleans		
20	12	Vicksburg	MS	2000	New Orleans		
20	13	St. Rose	LA	2000	New Orleans		
20	14	Good Hope	LA	2000	New Orleans		
20	15	Vicksburg	MS	2000	New Orleans		
20	16	Knoxville	TN	2000	New Orleans		
20	17	Lake Charles	LA	2000	New Orleans		
20	18	Shreveport-Bossier	LA	2000	New Orleans		
20	81	Jackson Muni Arpt	MS	2000	New Orleans		
20	95	Fed Express	TN	2000	New Orleans		
21	01	Beaumont-Port Arthur	TX	2100	Lake Charles		
21	02	Sabine	TX	2100	Lake Charles		
21	03	Orange	TX	2100	Lake Charles		
21	04	Beaumont	TX	2100	Lake Charles		
21	05	Lake Charles	LA	2100	Lake Charles		
22	01	Galveston	TX	2200	Galveston		
22	04	Freeport	TX	2200	Galveston		
22	05	Corpus Christi	TX	2200	Galveston		
22	08	Port Lavaca	TX	2200	Galveston		
23	01	Brownsville	TX	2300	Hidalgo		
23	02	Del Rio	TX	2300	Hidalgo		

Dist	Code	City		Border Group	Border Region	Select	Province
23	03	Eagle Pass	, TX	2300	Hidalgo		
23	04	Laredo	, TX	2300	Hidalgo		
23	05	Hidalgo	, TX	2300	Hidalgo		
23	07	Rio Grande City	, TX	2300	Hidalgo		
23	08	San Antonio	, TX	2300	Hidalgo		
23	09	Progresso	, TX	2300	Hidalgo		
23	10	Roma	, TX	2300	Hidalgo		
24	02	El Paso	, TX	2400	El Paso		
24	03	Presidio	, TX	2400	El Paso		
24	04	Fabens	, TX	2400	El Paso		
24	05	Denver	, CO	2400	El Paso		
24	06	Columbus	, TX	2400	El Paso		
24	07	Alburquerque	, NM	2400	El Paso		
24	08	Santa Teresa Airport	, NM	2400	El Paso		
25	01	San Diego	, CA	2500	Tecate		
25	02	Andrade	, CA	2500	Tecate		
25	03	Calexico	, CA	2500	Tecate		
25	04	San Ysidro	, CA	2500	Tecate		
25	05	Tecate	, CA	2500	Tecate		
25	06	Otay Mesa Station	, CA	2500	Tecate		
26	01	Douglas	, AZ	2600	Phoenix		
26	02	Lukeville	, AZ	2600	Phoenix		
26	03	Naco	, AZ	2600	Phoenix		
26	04	Nogales	, AZ	2600	Phoenix		
26	05	Phoenix	, AZ	2600	Phoenix		
26	06	Sasabe	, AZ	2600	Phoenix		
26	08	San Luis	, AZ	2600	Phoenix		
26	09	Tucson	, AZ	2600	Phoenix		
27	04	Los Angeles	, CA	2700	Los Angeles		
27	07	Port San Luis	, CA	2700	Los Angeles		
27	09	Long Beach	, CA	2700	Los Angeles		
27	11	El Segundo	, CA	2700	Los Angeles		
27	12	Ventura	, CA	2700	Los Angeles		
27	13	Port Hueneme	, CA	2700	Los Angeles		
27	15	Capitan	, CA	2700	Los Angeles		
27	19	Morro	, CA	2700	Los Angeles		
27	20	LA Intl. Airport	, CA	2700	Los Angeles		
27	22	Las Vegas	, NV	2700	Los Angeles		
27	70	DHL, Los Angeles	, CA	2700	Los Angeles		
27	72	Gateway Freight	, CA	2700	Los Angeles		
27	73	Air Cargo Handling	, CA	2700	Los Angeles		
27	74	Virgin Atlantic Carg	, CA	2700	Los Angeles		
27	95	UPS, Ontario	, CA	2700	Los Angeles		
28	01	San Francisco Arprt	, CA	2800	San Francisco Arprt		
28	02	Eureka	, CA	2800	San Francisco Arprt		

ist	Code	City		Border Group	Border Region	Select	Province
8	03	Fresno	, CA	2800 San Francisco Arprt			
8	05	Monterey	, CA	2800 San Francisco Arprt			
8	09	San Francisco-Oaklan	, CA	2800 San Francisco Arprt			
8	10	Stockton	, CA	2800 San Francisco Arprt			
8	11	Oakland	, CA	2800 San Francisco Arprt			
8	12	Richmond	, CA	2800 San Francisco Arprt			
8	13	Alameda	, CA	2800 San Francisco Arprt			
8	15	Crockett	, CA	2800 San Francisco Arprt			
8	16	Sacramento	, CA	2800 San Francisco Arprt			
8	20	Martinez	, CA	2800 San Francisco Arprt			
8	21	Redwood City	, CA	2800 San Francisco Arprt			
8	27	Selby	, CA	2800 San Francisco Arprt			
8	28	San Joaquin River	, CA	2800 San Francisco Arprt			
8	29	San Pablo Bay	, CA	2800 San Francisco Arprt			
8	30	Carquinez Strait	, CA	2800 San Francisco Arprt			
8	31	Suisun Bay	, CA	2800 San Francisco Arprt			
8	32	Salt Lake City	, UT	2800 San Francisco Arprt			
8	33	Reno	, NV	2800 San Francisco Arprt			
8	34	San Jose Intl.	, CA	2800 San Francisco Arprt			
8	70	DHL Worldwide Expres	, CA	2800 San Francisco Arprt			
8	71	Air Cargo Handling	, CA	2800 San Francisco Arprt			
8	72	Tnt Skypak, SF	, CA	2800 San Francisco Arprt			
9	01	Astoria	, OR	2900 Portland			
9	02	Newport	, OR	2900 Portland			
9	03	Coos Bay	, OR	2900 Portland			
9	04	Portland	, OR	2900 Portland			
9	05	Longview	, WA	2900 Portland			
9	07	Boise	, ID	2900 Portland			
9	08	Vancouver	, WA	2900 Portland			
9	09	Kalama	, WA	2900 Portland			
9	10	Portland	, OR	2900 Portland			
9	81	Kingsley Field	, OR	2900 Portland			
9	91	Federal Express	, OR	2900 Portland			
0	01	Puget Sound	, WA	3000 Puget Sound			
0	02	Tacoma	, WA	3000 Puget Sound			
0	03	Aberdeen	, WA	3000 Puget Sound			
0	05	Bellingham	, WA	3000 Puget Sound			
0	06	Everett	, WA	3000 Puget Sound			
0	07	Port Angeles	, WA	3000 Puget Sound			
0	08	Port Townsend	, WA	3000 Puget Sound			
0	10	Anacortes	, WA	3000 Puget Sound			
0	14	Friday Harbor	, WA	3000 Puget Sound			
0	16	Laurier	, WA	3000 Puget Sound			
0	18	Kenmore air harbor	, WA	3000 Puget Sound			
0	22	Spokane	, WA	3000 Puget Sound			
0	26	Olympia	, WA	3000 Puget Sound			
0	27	Neah Bay	, WA	3000 Puget Sound			
0	29	Seattle-Tacoma Arprt	, WA	3000 Puget Sound			
0	71	UPS, Seattle	, WA	3000 Puget Sound			
0	72	Avion Brokers, Seatt	, WA	3000 Puget Sound			
0	73	DHL Worldwide Expres	, WA	3000 Puget Sound			

ist	Code	City		Border Group		Border Region		Select	Province
30	74	Airborne Express	, WA	3000	Puget Sound				
30	81	Yakima Air Terminal	, WA	3000	Puget Sound				
30	04	Blaine	, WA	3040	Washington West	3040	Washington	West	BC
30	09	Sumas	, WA	3040	Washington West	3040	Washington	West	BC
30	17	Point Roberts	, WA	3040	Washington West	3040	Washington	West	BC
30	23	Lynden	, WA	3040	Washington West	3040	Washington	West	BC
30	11	Nighthawk	, WA	3050	Washington East	3040	Washington	West	BC
30	12	Danville	, WA	3050	Washington East	3040	Washington	West	BC
30	13	Ferry	, WA	3050	Washington East	3040	Washington	West	BC
30	15	Boundary	, WA	3050	Washington East	3040	Washington	West	BC
30	19	Oroville	, WA	3050	Washington East	3040	Washington	West	BC
30	20	Frontier	, WA	3050	Washington East	3040	Washington	West	BC
30	25	Metaline Falls	, WA	3050	Washington East	3040	Washington	West	BC
31	01	Juneau	, AK	3100	Anchorage				
31	02	Ketchikan	, AK	3100	Anchorage				
31	03	Skagway	, AK	3100	Anchorage				
31	04	Alcan	, AK	3100	Anchorage				
31	05	Wrangell	, AK	3100	Anchorage				
31	06	Dalton Cache	, AK	3100	Anchorage				
31	07	Valdez	, AK	3100	Anchorage				
31	11	Fairbanks	, AK	3100	Anchorage				
31	12	Petersburg	, AK	3100	Anchorage				
31	15	Sitka	, AK	3100	Anchorage				
31	24	Pelican	, AK	3100	Anchorage				
31	25	Sand Point	, AK	3100	Anchorage				
31	26	Anchorage	, AK	3100	Anchorage				
31	27	Kodiak	, AK	3100	Anchorage				
31	81	St Paul Arpt, Anchor	, AK	3100	Anchorage				
31	95	Fed Express, Anchora	, AK	3100	Anchorage				
31	96	Ups, anchorage	, AK	3100	Anchorage				
32	01	Honolulu	, HI	3200	Honolulu				
32	02	Hilo	, HI	3200	Honolulu				
32	03	Kahului	, HI	3200	Honolulu				
32	04	Nawiliwili-Port Alln	, HI	3200	Honolulu				
32	05	Nawiliwili-Port Alln	, HI	3200	Honolulu				
32	95	UPS Courier	, HI	3200	Honolulu				
33	03	Salt Lake City	, UT	3300	Butte				
33	04	Great Falls	, MT	3300	Butte				
33	05	Butte	, MT	3300	Butte				
33	07	Denver	, CO	3300	Butte				
33	82	Natrona City Arpt	, MT	3300	Butte				
33	01	Raymond	, MT	3340	Raymond	3480	Regina South	West	SK
33	09	Scobey	, MT	3340	Raymond	3480	Regina South	West	SK
33	12	Whitetail	, MT	3340	Raymond	3480	Regina South	West	SK
33	17	Opheim	, MT	3340	Raymond	3480	Regina South	West	SK

Dist	Code	City		Border Group		Border Region		Select	Province
33	06	Turner	, MT	3350	Turner/Morgan	3480	Regina South	West	SK
33	19	Morgan	, MT	3350	Turner/Morgan	3480	Regina South	West	SK
33	10	Sweetgrass	, MT	3360	Sweetgrass	3360	Sweetgrass	West	AB
33	16	Piegan	, MT	3360	Sweetgrass	3360	Sweetgrass	West	AB
33	21	Whitlash	, MT	3360	Sweetgrass	3360	Sweetgrass	West	AB
33	22	Del Bonita	, MT	3360	Sweetgrass	3360	Sweetgrass	West	AB
33	18	Roosville	, MT	3370	Roosville	3380	Idaho	West	BC
33	02	Eastport	, ID	3380	Eastport/Porthill	3380	Idaho	West	BC
33	08	Porthill	, ID	3380	Eastport/Porthill	3380	Idaho	West	BC
34	81	Hector Airport	, ND	3400	3400				
34	23	Warroad	, MN	3450	Roseau	3460	Winnipeg South	West	MB
34	24	Baudette	, MN	3450	Roseau	3460	Winnipeg South	West	MB
34	25	Pinecreek	, MN	3450	Roseau	3460	Winnipeg South	West	MB
34	26	Roseau	, MN	3450	Roseau	3460	Winnipeg South	West	MB
34	01	Pembina	, MN	3460	Pembina	3460	Winnipeg South	West	MB
34	02	Noyes	, MN	3460	Pembina	3460	Winnipeg South	West	MB
34	04	Neche	, ND	3460	Pembina	3460	Winnipeg South	West	MB
34	07	Walhalla	, ND	3460	Pembina	3460	Winnipeg South	West	MB
34	16	Maida	, ND	3460	Pembina	3460	Winnipeg South	West	MB
34	05	St. John	, ND	3470	Dunseith	3480	Regina South	West	SK
34	08	Hannah	, ND	3470	Dunseith	3480	Regina South	West	SK
34	09	Sarles	, ND	3470	Dunseith	3480	Regina South	West	SK
34	15	Hansboro	, ND	3470	Dunseith	3480	Regina South	West	SK
34	22	Dunseith	, ND	3470	Dunseith	3480	Regina South	West	SK
34	03	Portal	, ND	3480	Dakota West	3480	Regina South	West	SK
34	06	Northgate	, ND	3480	Dakota West	3480	Regina South	West	SK
34	10	Ambrose	, ND	3480	Dakota West	3480	Regina South	West	SK
34	13	Antler	, ND	3480	Dakota West	3480	Regina South	West	SK
34	14	Sherwood	, ND	3480	Dakota West	3480	Regina South	West	SK
34	17	Fortuna	, ND	3480	Dakota West	3480	Regina South	West	SK
34	19	Westhope	, ND	3480	Dakota West	3480	Regina South	West	SK
34	20	Noonan	, ND	3480	Dakota West	3480	Regina South	West	SK
34	21	Carbury	, ND	3480	Dakota West	3480	Regina South	West	SK
35	01	Minneapolis-St. Paul	, MN	3500	Minneapolis-St. Paul				
36	01	Duluth	, MN	3601	Duluth				
36	02	Ashland	, MN	3604	Minnesota East	3604	Minnesota East	West	ON
36	04	International Falls	, MN	3604	Minnesota East	3604	Minnesota East	West	ON
36	08	Superior	, WI	3604	Minnesota East	3604	Minnesota East	West	ON
36	13	Grand Portege	, MN	3604	Minnesota East	3604	Minnesota East	West	ON
36	14	Silver Bay	, MN	3604	Minnesota East	3604	Minnesota East	West	ON

Dist	Code	City		Border Group		Border Region		Select	Province
37	01	Milwaukee	, WI	3700	Racine				
37	02	Marinette	, WI	3700	Racine				
37	03	Green Bay	, WI	3700	Racine				
37	06	Maitowic	, WI	3700	Racine				
37	07	Sheboygan	, WI	3700	Racine				
37	08	Racine	, WI	3700	Racine				
38	05	Battle Creek	, MI	3800	Battle Creek				
38	06	Grand Rapids	, MI	3800	Battle Creek				
38	08	Escanaba	, MI	3800	Battle Creek				
38	09	Marquette	, MI	3800	Battle Creek				
38	14	Algonac	, MI	3800	Battle Creek				
38	16	Grand haven	, MI	3800	Battle Creek				
38	18	Rogers city	, MI	3800	Battle Creek				
38	19	De tour village	, MI	3800	Battle Creek				
38	20	Mackinac island	, MI	3800	Battle Creek				
38	42	Presque isle	, MI	3800	Battle Creek				
38	43	Alpena	, MI	3800	Battle Creek				
38	44	Ferrysburg	, MI	3800	Battle Creek				
38	81	Oakland-Pontiac Arpt	, MI	3800	Battle Creek				
38	82	Willow Run Airport	, MI	3800	Battle Creek				
38	01	Detroit	, MI	3801	Detroit	3801	Michigan	East	ON
38	02	Port Huron	, MI	3802	Port Huron	3801	Michigan	East	ON
38	03	Sault St. Marie	, MI	3803	Sault St. Marie	3801	Michigan	East	ON
38	04	Saginaw-Bay City	, MI	3804	Saginaw-Bay City				
38	15	Muskegon	, MI	3815	Muskegon				
39	01	Chicago	, IL	3900	Chicago				
39	02	Peoria	, IL	3900	Chicago				
39	03	Omaha	, NE	3900	Chicago				
39	04	East Chicago	, IL	3900	Chicago				
39	05	Gary	, IN	3900	Chicago				
39	06	O'Hara Airport	, IL	3900	Chicago				
39	07	Des Moines	, IA	3900	Chicago				
39	08	Quad City	, IA	3900	Chicago				
39	81	Waukegan Airport	, IL	3900	Chicago				
39	82	Greater Rockford Arp	, IL	3900	Chicago				
39	91	Nippon Courier Hub	, IL	3900	Chicago				
41	02	Cincinnati	, OH	4100	Dayton				
41	03	Columbus	, OH	4100	Dayton				
41	04	Dayton	, OH	4100	Dayton				
41	08	Ashtabula	, OH	4100	Dayton				
41	09	Conneaut	, OH	4100	Dayton				
41	11	Fairport	, OH	4100	Dayton				
41	12	Akron	, OH	4100	Dayton				

Dist	Code	City		Border Group	Border Region	Select	Province
41	17	Huron	, OH	4100	Dayton		
41	21	Lorain	, OH	4100	Dayton		
41	70	Burlington Air Expre	, OH	4100	Dayton		
41	81	Airbourne Air Park	,	4100	Dayton		
41	82	Rickenbacker Airport	,	4100	Dayton		
41	83	Fort wayne Airport	,	4100	Dayton		
41	84	Bluegrass Airport	,	4100	Dayton		
41	95	Emery World-Wide	, OH	4100	Dayton		
41	96	UPS Louisville	, KY	4100	Dayton		
41	97	DHL Cincinnati	, OH	4100	Dayton		
41	01	Cleveland	, OH	4101	Cleveland		
41	05	Toledo	, OH	4105	Toledo		
41	07	Sandusky	, OH	4106	Sandusky		
41	22	Ashtabula-Conneaut	, OH	4122	Ashtabula-Conneaut		
41	06	Erie	, PA	4130	Erie		
41	10	Indianapolis	, IN	4140	Evansville		
41	13	Evansville	, IN	4140	Evansville		
41	14	Lawrenceburg	, IN	4150	Owensboro		
41	15	Louisville	, KY	4150	Owensboro		
41	16	Owensboro	, KY	4150	Owensboro		
45	01	Kansas City	, MO	4500	St. Louis		
45	02	St. Joseph	, MO	4500	St. Louis		
45	03	St. Louis	, MO	4500	St. Louis		
45	04	Wichita	, KN	4500	St. Louis		
45	05	Springfield, missour	,	4500	St. Louis		
49	01	Aguadilla	, PR	4900	Puerto Rico		
49	04	Fajardo	, PR	4900	Puerto Rico		
49	05	Guanica	, PR	4900	Puerto Rico		
49	06	Humacao	, PR	4900	Puerto Rico		
49	07	Mayaguez	, PR	4900	Puerto Rico		
49	08	Ponce	, PR	4900	Puerto Rico		
49	09	Sanjuan	, PR	4900	Puerto Rico		
49	11	Jobos	, PR	4900	Puerto Rico		
49	12	Guayanilla	, PR	4900	Puerto Rico		
49	13	San Juan Intl Arpt	, PR	4900	Puerto Rico		
51	01	Charlotte Amalie	, VI	5100	Virgin Islands		
51	02	Cruz Bay	, VI	5100	Virgin Islands		
51	03	Coral Bay	, VI	5100	Virgin Islands		
51	04	Christiansted	, VI	5100	Virgin Islands		
51	05	Frederiksted	, VI	5100	Virgin Islands		

Dist	Code	City		Border Group	Border Region	Select	Province
52	01	Miami	, FL	5200	Miami		
52	02	Key West	, FL	5200	Miami		
52	03	Port Everglades	, FL	5200	Miami		
52	04	West Palm Beach	, FL	5200	Miami		
52	05	Fort Pierce	, FL	5200	Miami		
52	06	Miami Airport	, FL	5200	Miami		
52	70	International Courie	, FL	5200	Miami		
53	01	Houston	, TX	5300	Houston		
53	06	Texas City	, TX	5300	Houston		
53	09	Houston Intl Airport	, TX	5300	Houston		
53	10	Galveston	, TX	5300	Houston		
53	11	Freeport	, TX	5300	Houston		
53	12	Corpus Christi	, TX	5300	Houston		
53	13	Port Lavaca	, TX	5300	Houston		
54	01	Washington	, DC	5400	Washington		
54	02	Alexandria	, VA	5400	Washington		
55	01	Dallas-Ft Worth	, TX	5500	Tulsa		
55	02	Amarillo	, TX	5500	Tulsa		
55	03	Lubbock	, TX	5500	Tulsa		
55	04	Oklahoma City	, OK	5500	Tulsa		
55	05	Tulsa	, OK	5500	Tulsa		
55	06	Austin	, TX	5500	Tulsa		
55	07	San antonio	, TX	5500	Tulsa		
55	82	Midland Intl Airport	, TX	5500	Tulsa		
60	00	Vessels Own Power	,	6000	6000		
70	00		,	7000	7000		
70	70	Low-Value Estimates	,	7000	7000		
80	00	Mail Shipments	,	8000	8000		
89	00	Electricity	,	8900	8900		
90	00	Undoc Exports to Can	,	9000	9000		

TA.4 TECHNICAL APPENDIX 4
AVERAGE ANNUAL GROWTH OF PASSENGER TRAFFIC
BY FRONTIER
(1,000'S)

FRONTIER	1990 VOLUME	1991 VOLUME	1992 VOLUME	3-YR AVE GROWTH RATE
MICHIGAN	16613	22205	22433	6.8%
NIAGARA	14729	19385	18615	0.4%
EAST NEW YORK	3718	5683	5774	14.5%
MONTREAL SOUTH	5975	8486	8373	8.8%
MAINE	9079	12663	12441	6.8%
TOTAL	50115	68422	67636	5.7%

TA.5 TECHNICAL APPENDIX 5
AVERAGE ANNUAL GROWTH OF COMMERCIAL TRAFFIC
BY FRONTIER
(1,000'S)

FRONTIER	1990 VOLUME	1991 VOLUME	1992 VOLUME	3-YR AVE GROWTH RATE
MICHIGAN	2583	2542	2858	5.2%
NIAGARA	1633	1510	1653	0.6%
EAST NEW YORK	400	403	431	3.8%
MONTREAL SOUTH	752	835	859	6.9%
MAINE	590	575	627	3.1%
TOTAL	5176	5865	6428	3.9%

TA.6 TECHNICAL APPENDIX 6
ESTIMATED GROWTH IN TWO WAY TRADE

FRONTIER	1992 TRADE LEVEL	1997 TRADE LEVEL (ESTIMATED)	5-YR PERCENT INCREASE
MICHIGAN	60923	74019	21.5
NIAGARA	35820	48501	35.4
EAST NEW YORK	7684	11441	48.9
MONTREAL SOUTH	17297	24780	43.6
MAINE	2964	3550	19.6

TA.7 TECHNICAL APPENDIX 7
ESTIMATED GROWTH IN TWO WAY SHIPMENTS

FRONTIER	1992 TRADE LEVEL	1997 TRADE LEVEL (ESTIMATED)	5-YR PERCENT INCREASE
MICHIGAN	25677	37610	46.5
NIAGARA	16439	21651	31.7
EAST NEW YORK	3397	4378	28.9
MONTREAL SOUTH	8060	10919	35.5
MAINE	1931	2633	36.4