Metro Vancouver Transport and Logistics system
Applied freight Research Initiative (METRO AFRI)

SECTOR PROFILE

The Cascade Gateway
Cross-border Flows and Systems

For Transport Canada, Translink, & BC Ministry of Transportation & Infrastructure

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March 2011

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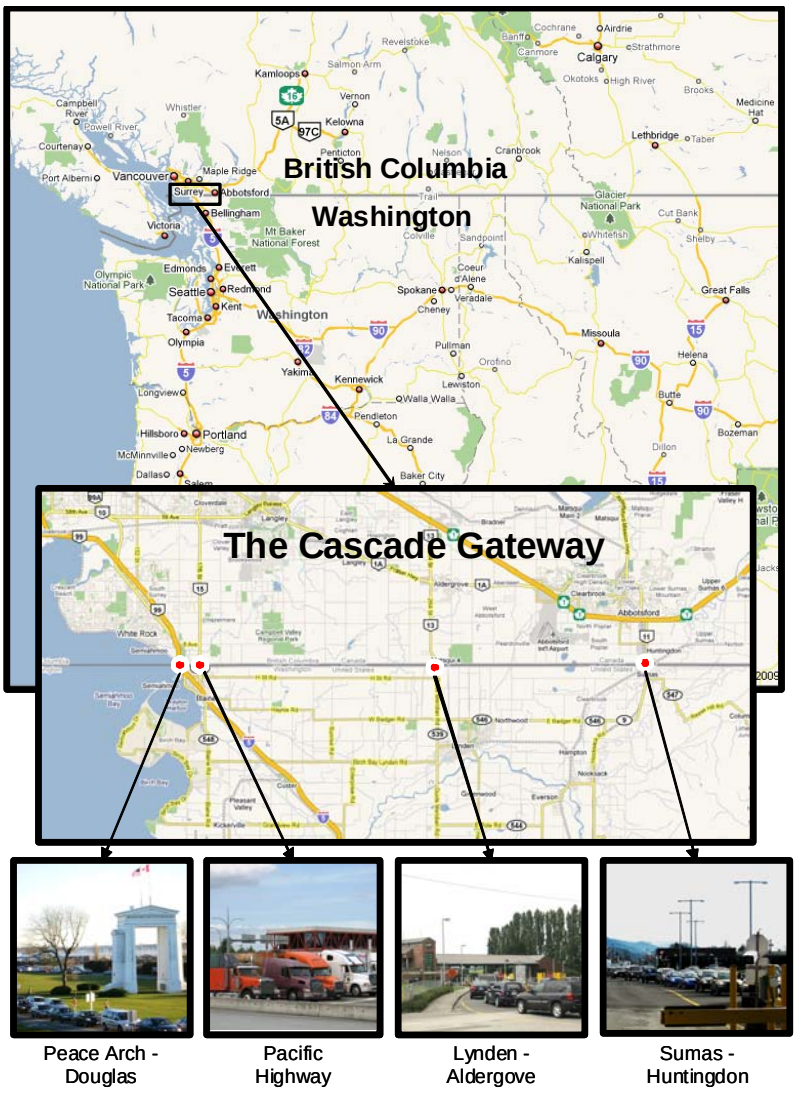
Introduction

The Cascade Gateway is the name given by regional stakeholders to the *set* of four land border ports-of-entry that connect flows of trade and travel between Lower Mainland British Columbia and Western Washington State.

Following the passage of the North American Free Trade Agreement (NAFTA) in 1994 as well as several years of high-growth in regional cross-border passenger travel, transportation agencies in Canada and the United States saw a need to dedicate greater attention to how cross-border transportation systems would serve continued growth resulting from reduced trade barriers and globalization.

In the almost two decades since NAFTA, many regional (and national) shifts have occurred relative to cross-border trade and commercial traffic. Volumes did rise quickly in the years following the trade agreements, stabilized, and most recently have seen a decline. Border inspection requirements have intensified, new inspection processes and programs have been established, and industries that ship and receive cross-border goods have responded to these developments in ways that merit analysis and greater understanding. Other determinants of cross-border freight transportation include monetary exchange rates, commodity specific price differences, and trade-policy events (ex. softwood lumber). More universal factors also apply to border traffic including fuel costs and labor supply (ex. truck drivers).

Figure 1: – The Cascade Gateway



This sector profile will examine the above in much greater detail. The first section on **supply** will review the inventory of transportation and inspection systems that define the rate which transportation demand can move to and through the Cascade Gateway. Supply is not only infrastructure (roads and border facilities) but includes other modes in the gateway geography (rail, marine, pipeline, air), staffing levels of federal inspection agencies, the capacity for completing required regulatory transactions, voluntary inspection-agency programs (ex. FAST), and third-party trade facilitation services (ex. brokerages).

Next this profile will evaluate transportation **demand** through the gateway. A review of long-term trends will set the stage for closer analysis of recent trends in volume,

commodity, and trade value. Characteristics of demand will be evaluated for implications for future investment and operations including trade-lane geography, trip typologies, vehicle types, inspection-agency program participation, load-factors, and more.

Following examinations of gateway supply and demand, the intersections of these themes can be reviewed for appropriate measures of Cascade Gateway **performance** – the third section of this profile.

The final section, under the heading, **opportunities**, will offer conclusions based on observations made in preceding sections as well as a review of what trends in Canadian and U.S. policy and regulations offer decision makers as our countries continue stress efficient and productive connections at our shared border.

Cascade Gateway system supply

Discussion of the regional cross-border system supply will begin with the border itself and expand along the physical and institutional networks as they relate to the movement of freight.

The border – broad view

Both Canada and the United States require that people and goods entering the country do so at legislatively designated ports-of-entry (POEs). On the *land border* between Lower Mainland British Columbia and Western Washington State there are five POEs—four of which are collectively referred to as the Cascade Gateway (see figure 1). The Point Roberts POE is low volume and somewhat removed from the demands of the main trade corridor. An initial observation about our countries' policies of limiting entry to POEs is the immediate constraint placed on route choice. This is especially apparent in the Cascade Gateway region where the border follows a circle of latitude (49° N) rather than an otherwise impassable geographic feature such as a river or mountain range.

There are, of course, important reasons that nations require entry at POEs. Consolidating flows of people and goods provides an efficient way for federal inspection services (FIS) to enforce immigration and trade laws and apply security and public safety strategies. Inasmuch as the scope and scale of FIS transactions are a meaningful determinant of system capacity, it is relevant to this analysis to take stock of current requirements and proposed changes.

The Cascade Gateway cross border transportation system

This section will review the supply of road and rail facilities that serve regional cross-border trade and travel demand but first review an important cross-border planning coalition that has fostered a more coordinated and coherent perspective on these shared systems.

The International Mobility & Trade Corridor Project – IMTC

The International Mobility and Trade Corridor Project is a regional, cross-border planning coalition that government agencies and private-sector interests participate in with the goal of identifying and promoting improvements of shared interest. Agencies, near-border municipalities, and non-governmental organizations who had started to foster a cross-border dialog on various planning and operations issues in the mid 1990s collectively responded to an opportunity for federal support for a more concerted binational approach. The U.S. government's Coordinated Border

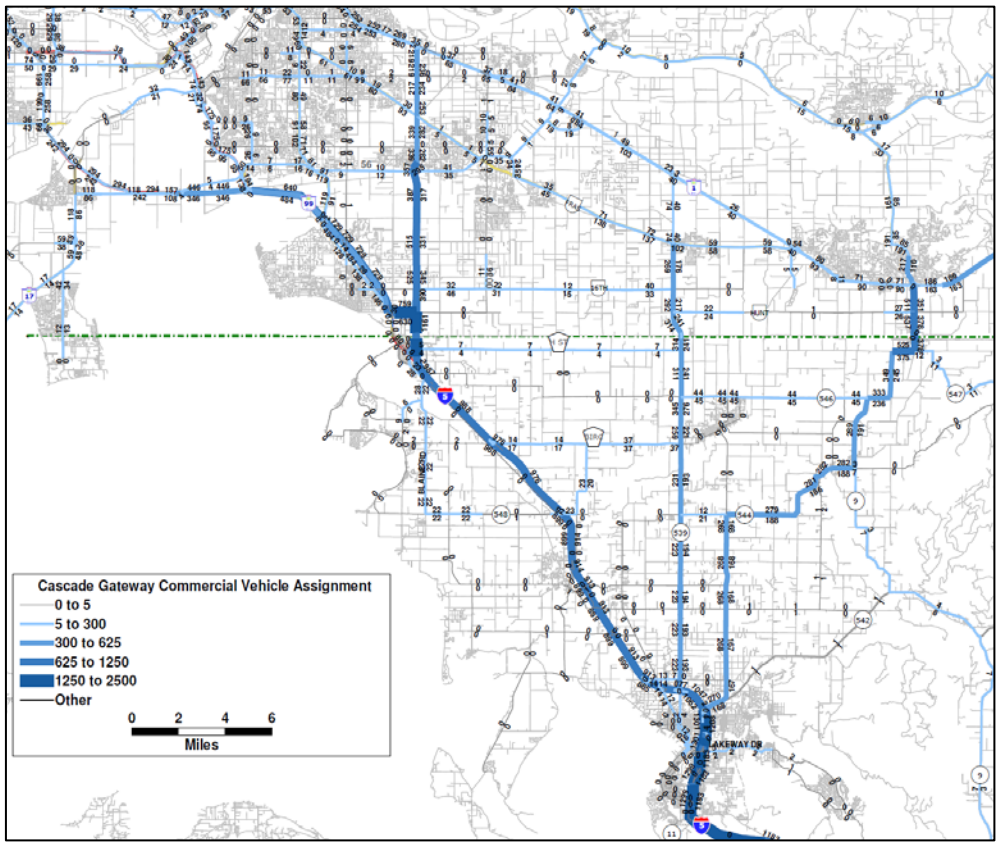
Infrastructure Program (CBI) was proposed in draft legislation in 1997 and enacted to be administered by the U.S. Department of Transportation in 1999. The CBI program offered financial assistance for improvements to cross-border infrastructure and operations as well as for "international coordination of transportation planning, programming, and border operation with Canada…" The Whatcom Council of Governments (WCOG), the U.S. federally designated metropolitan planning organization (MPO) in the region was a participant in the emerging IMTC working group as well as an eligible recipient for CBI program support. IMTC, with WCOG as a lead agency, has been successful in attracting support from the CBI program as well as individual border improvements funded by multiple agencies from both sides of the border. More information on IMTC is online at http://wcog.org/Border.aspx.

In addition to identifying the IMTC Project as an important institution among cross-border agencies and system users, it should be pointed out that the name Cascade Gateway was initiated by IMTC participants to better promote the advantages of planning and managing the set of four border crossings as a single, shared system.

The road network

Over the last few years, IMTC has advanced the undertaking of the Cascade Gateway Cross-border Circulation Analysis. Among other things, this project has used robust vehicle survey data to identify the primary routes of cross-border travelers and freight. An example of model-based identification of these routes is pictured below. More detailed documentation of Cascade Gateway route identification is available at http://wcog.org/Border/IMTC-Projects/IMTC-Border-Circulation-Analysis/66.aspx

Figure 2: Assignment of Cascade Gateway commercial trip survey data (2009 IMTC CVO Study) to the cross-border road network.



The border – agency-level view

Canada Border Services Agency

The primary FIS for entry points to Canada is the Canada Border Services Agency (CBSA). Specific immigration related matters may be referred to Citizenship and Immigration Canada (CIC) officers who also work at Canadian POEs.

United States Customs and Border Protection

U.S. Customs and Border Protection (US CBP) is the primary FIS at POEs entering the United States. Immigration issues that arise at the border are also handled by US CBP. Other FIS work alongside CBP such as Animal Plant Health Inspection Service (APHIS).

General responsibilities of U.S. and Canadian border inspection agencies

Admissibility of people: When travelers or drivers of cargo conveyances arrive at a border they are, implicitly, making an application for entry into the country. FIS ensure that legal and regulatory thresholds for admissibility are met. These include citizenship or acceptable visitor status, proper forms of identification and visas, parameters around criminal records, and labor rules.

Trade laws: The traditional federal customs-agency functions include categorization of goods, assessment and collection of duties, and regulation or interdiction of controlled imports and exports.

Interdiction of contraband and threats to public safety, and national security: This category has grown in profile over the last decade and grown in ways that has strongly affected system capacity—supply. In addition to prevention of smuggled commodities, over time, FIS have greatly increased their activities related to interdiction of harmful or diseased food products and livestock, controlled narcotic substances, illegal movement of money, human smuggling and trafficking, contagious diseases, terrorists, and weapons of mass destruction.

Border Brokerages

In both Canada and the United States, compliance with complex import entry laws is, for the most part, managed as a professional-service by brokers who are licensed agents of their respective government agencies (CBSA or US CBP). Exporters hire brokerages to correctly classify the goods they are shipping to the other country, determine what duty (if any) is owed based on tariff schedule and rules of origin, facilitate payment of those duties, and complete and file all the required paperwork. The high volume of transactions and information requirements inherent in these processes is another important dimension of system capacity.

In addition to surface transportation (highway and rail), travelers and freight also transit this region's international border by air and marine modes. Strategically, it is valuable to understand the determinants of populations' and firms' relative use of these different modes over time.

Third party logistics providers

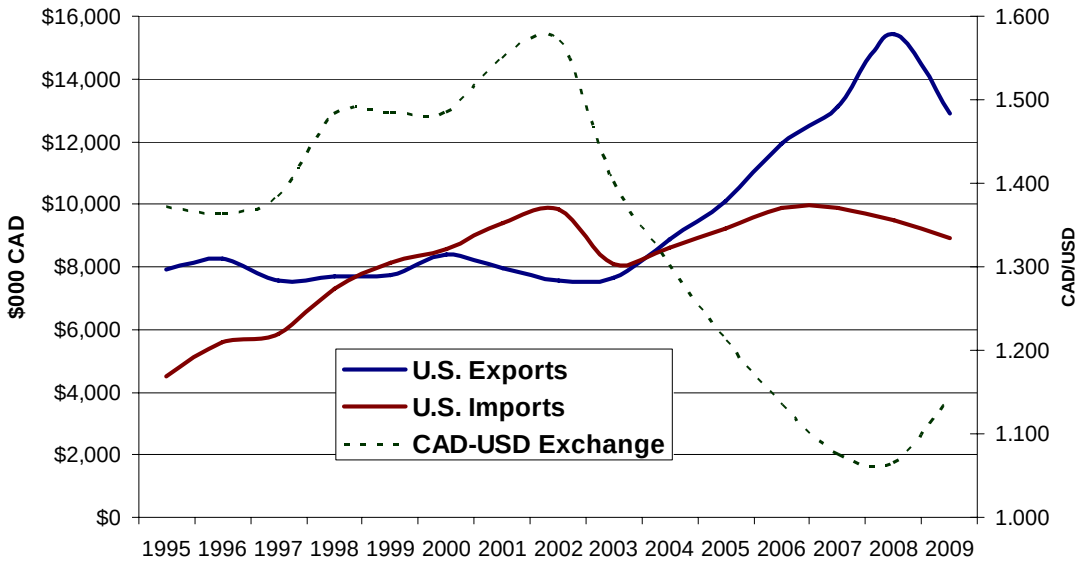
Third party logistic providers (often referred to as 3PLs) are firms that work with shippers and carriers to arrange pickup and deliveries, consolidation of loads, equipment position, interline transfers and distribution, and location of backhaul. Increased interest in load efficiency, fuel savings, and basic profit margin has lead to growth in this sector and increasing application of information technology to the services offered (ex. internet based load matching). The effect that these business practices have had on freight capacity (greater conveyance asset utilization) deserves

careful attention as policy makers evaluate past trends to develop forecasts of future system demands.

Cascade Gateway trade transportation demand

The Cascade Gateway trade profile, since the NAFTA (1994), has been one of steady growth in the *value* of goods crossing the border. Chart 1 below, shows that growth from 1994 though about 2001, was lead by Canadian exports to the U.S. With steadily growing relative strength of the Canadian Dollar, 2001-2008 saw a period of stronger growth in Canadian consumption of U.S. exports. By 2009, the combination of wide spread economic recession coupled with a one-year drop in Canadian currency value seems to have contributed to a drop in both countries' regional export value.

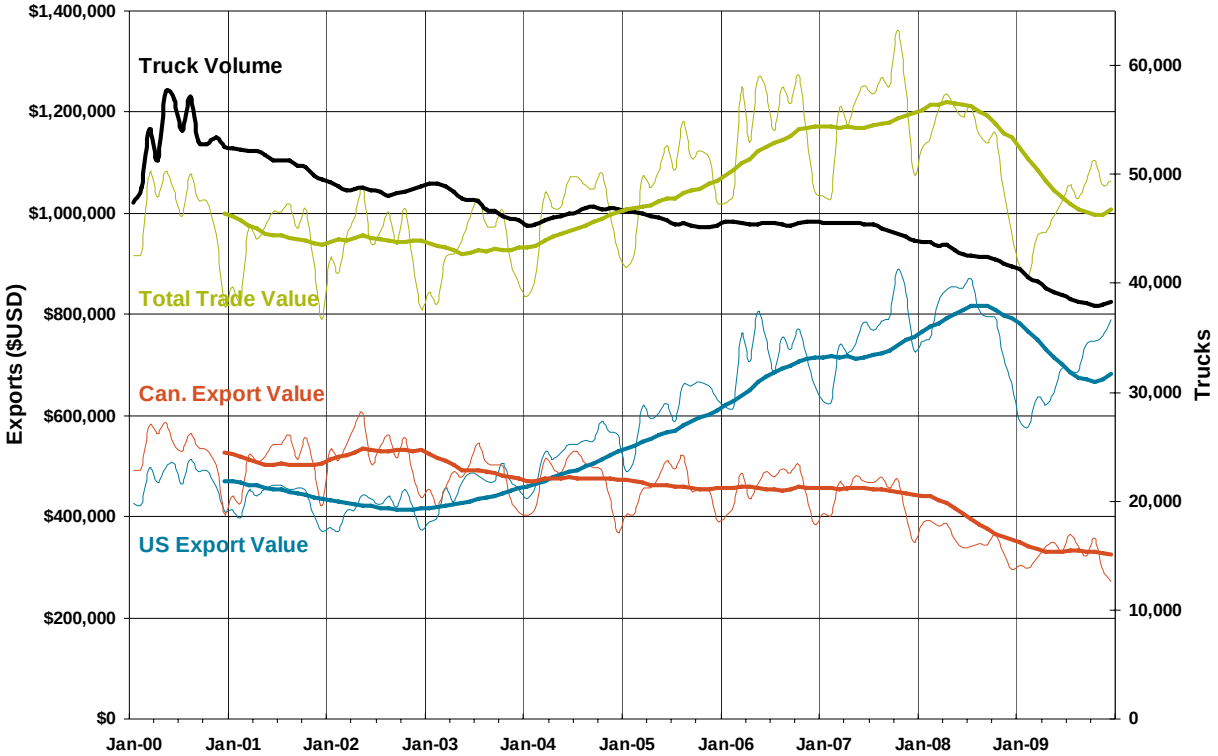
Chart 1. Annual, Truck-borne Trade Value ($000 CAD) via Cascade Gateway Ports of Entry, Adjusted for Inflation, with Annual Average Exchange Rate, 1995-2009



Data Sources: Trade Values; U.S. Department of Transportation, Research and Innovative Technology Administration (RITA), Bureau of Transportation Statistics (BTS), North American Transborder Freight Data. Inflation Indices; U.S. Department of Labor, Bureau of Labor Statistics. Monetary exchange; Bank of Canada.
Compiled by: Whatcom Council of Governments

The value trend does not, however, match very well with the related, commercial *vehicle* transportation demand. Chart 2 below illustrates that, at least since 2001, Cascade Gateway truck volume has been steadily declining while total, two-way trade volume increased through early 2008.

Chart 2. 2000-2009, Cascade Gateway Trade Value and Truck Volume



Data Sources: Trade Values; U.S. Department of Transportation, Research and Innovative Technology Administration (RITA), Bureau of Transportation Statistics (BTS), North American Transborder Freight Data. Inflation Indices; U.S. Department of Labor, Bureau of Labor Statistics. Truck counts (NB & SB combined moving average.) US CBP & Statistics Canada.
Compiled by: Whatcom Council of Governments.

The two charts above give an overview of regional cross-border goods movement over the last 15 years and show a curious diversion of commerce (increasing trade value) and truck-trips (declining) made to complete those international transactions (most pronounced from 2005 to 2008).

The following subsections will lay out detailed data on Cascade Gateway cross-border trade activity and characteristics. The focus will be within the last decade (1999-2009) but include, when informative, shorter periods and smaller units of time.

A final section will cover Cascade Gateway cross-border rail freight.

Cross-border shipments and commercial vehicles – defined

Trade data: shipments, entries, manifests, and more

The most consistently available data on cross-border trade and travel is extracted from transactions of both countries' inspection agencies. When a bundle of goods moves between a seller on one side of the border and a buyer on the other, this is a **shipment**. Each shipment that is entered into the commerce of the other country requires some amount of **entry documentation**. Shipment entries are used to determine applicable duties and tariffs. These transactions, which are often handled by customs-brokers, are the basic source of transborder freight data such as that provided via the U.S. Bureau of Transportation Statistics. The data extracted from these

transactions includes aggregate measures of commodity, value, weight, border crossing location, and state/province of origin/destination. **Entry-based data is not related to vehicles**. A truck may be loaded or it may be empty. A loaded truck may have one shipment (a **truck-load truck**) or it may be loaded with many shipments (a **less than truckload truck – or "LTL"**).

Another source of data, though not one used much by trade-data providers, is manifests. **Manifests** are documents required of the **carrier** (in this case the truck company). They are a simpler declaration of what is on the vehicle, where it was picked up, and where it is going. Manifest data can be used to assess commodity flow, high-level origin-destination, and TL-LTL ratios. It cannot directly capture flows of empty trucks. Because empty trucks have nothing on board, the carrier is not required to submit a manifest.

Since 2002, the United States has required cross-border carriers to file **advanced electronic cargo information**. Much like the information included on a manifest, this requirement has since been blended with US CBP's electronic manifest (**E-Manifest**) program. As part of the CBP's larger Automated Commercial Environment initiative (ACE), efforts are being pursued to improve the degree to which trade data can be related to vehicle data.

Canada has recently announced a schedule for shifting towards advanced cargo information requirements for cross-border freight. Electronic transmission will be required sometime in 2012. So, there is a future potential for bidirectional automated data collection that relates trade flows to vehicle flows.

How do you know it's a truck?

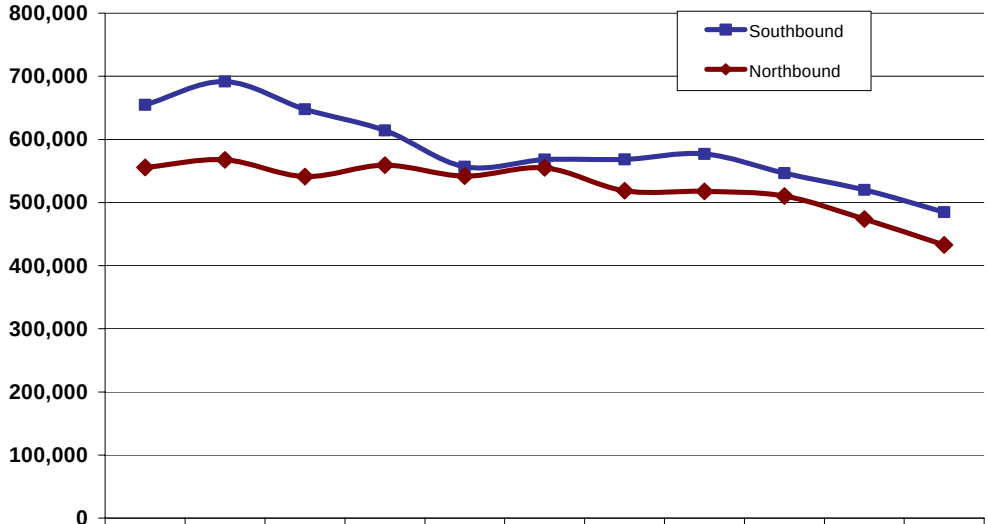
Going back to the fact that the most consistently available border data originates from the inspection agencies, the basic demand volume unit we refer to as "truck counts" needs to be clarified. CBP and CBSA count any vehicle that enters through its commercial inspection booths as a commercial vehicle – or "a truck." This reality is often cited with concern by transportation agencies that, for good reasons, typically use carefully classified definitions and sub definitions of trucks.

To explain this a bit more, it is true that big trucks must use a "truck" port of entry and "truck booths" simply because they are big trucks. But it is also true that anyone carrying goods for entry into the commerce of the other country must arrive at the inspection booths dedicated for this transaction. And indeed, many goods are imported in cars. And, some cars *are* the imported good.

Cascade Gateway Truck Counts

Truck counts are collected by US CBP and CBSA and distributed by US CBP and Statistics Canada respectively. They are made available in monthly totals by port of entry and direction. Statistics Canada also breaks the counts into U.S. and Canadian based trucks. Summaries of this data follow.

Chart 3. 1999-2009 Cascade Gateway Cross-Border Truck Volume by Direction



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Southbound	654,746	691,579	647,898	614,404	556,616	568,143	568,169	576,967	546,377	519,948	484,984
Northbound	555,620	567,575	541,253	559,250	541,856	554,954	518,732	517,765	510,252	473,706	432,783

One of the first things noticed in Chart 3 is the large discrepancy in northbound (CBSA) and southbound (CBP) counts, especially in the first three years shown ('99-'01). Theoretically, the counts should be approximately equal. A cross-border trip should usually entail traveling (and being counted in) both directions. Some sources of difference include cars driving as exports (one way), cars carrying goods one direction and entering as a passenger vehicle in the other, and trucks that make one of the crossings outside the Cascade Gateway region. The largest source of difference though is probably counting error. Why the difference has diminished is not well understood.

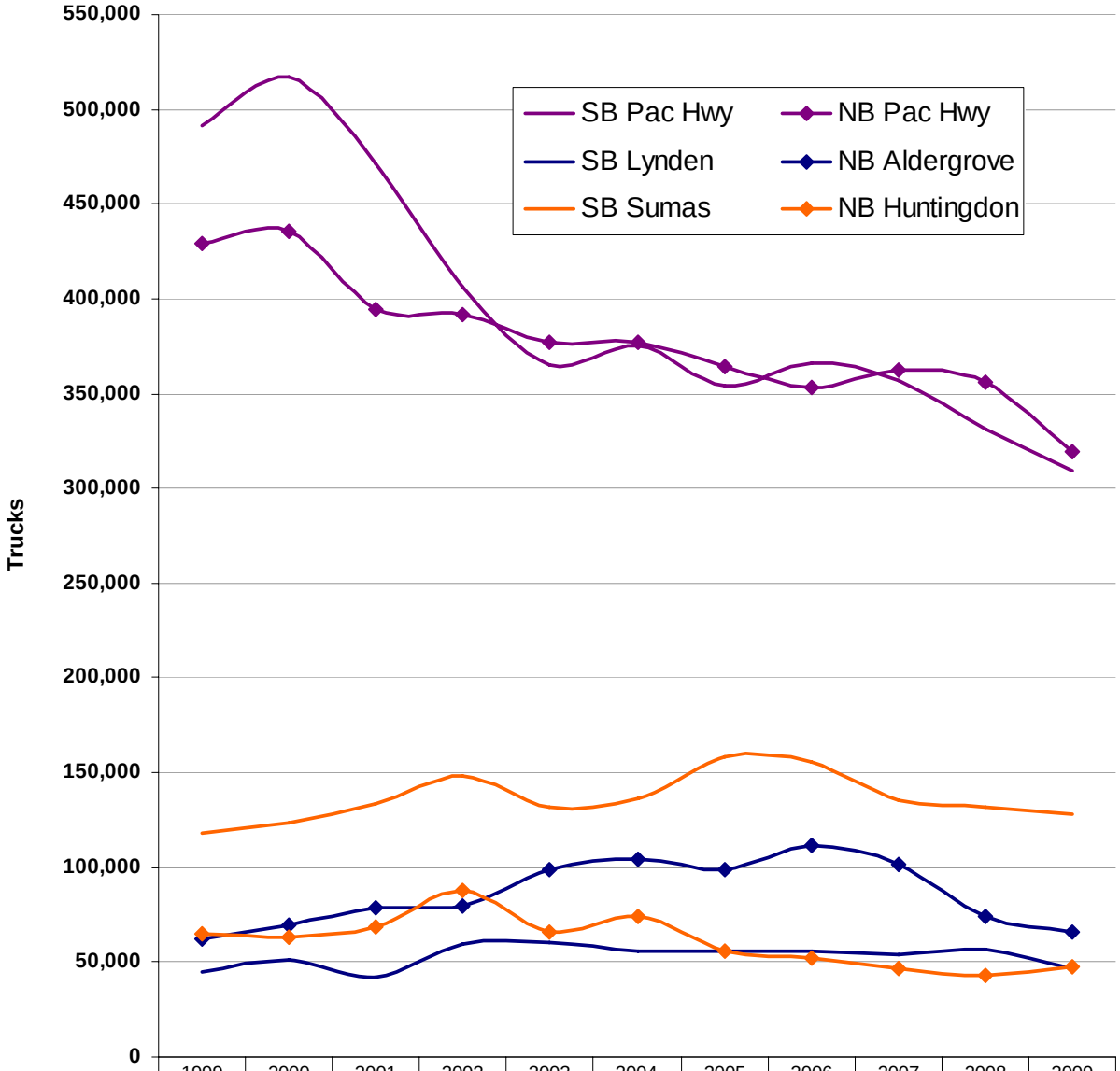
Specific issues that arise when reviewing the regional truck volume trend include:

- 1999-2001: While significantly different totals, the trends match fairly well.
- 2001-2002: Continued discrepancy is compounded by a contradictory trend.
- 2003-2004: Good fit between the two sources.
- 2004-2005: A second, though less prominent divergence in trend.
- 2005-2009: A smaller yet more consistent discrepancy persists. The trend over these last four years matches well between the two sources.

Some general observations are:

- A conservative read of this data is that Cascade Gateway cross-border truck volume was fairly steady from 1999-2006 and then started a slow and gradually increasing rate of decline through 2009.
- Based on annual measures of truck volume, a "9/11" effect is not evident. A downward trend in southbound counts had already begun. The slight drop in the 2003 northbound count is modest and smaller than one-year drops over the same time frame.
- The 2006-2009 downward trend aligns well with the beginning and continuation of "the Great Recession."

Chart 4. 1999-2009 Cascade Gateway Cross-Border Truck Counts, by Crossing, by Direction (SB = southbound, NB = northbound).



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SB Pac Hwy	491,885	516,829	471,731	406,667	365,089	375,169	354,264	365,959	356,499	331,195	309,736
NB Pac Hwy	428,878	435,166	394,038	391,584	377,157	376,900	364,325	353,526	362,354	356,380	319,707
SB Lynden	44,887	51,330	42,519	59,121	60,072	56,167	55,907	55,853	54,201	56,855	46,999
NB Aldergrove	62,184	69,316	78,689	79,742	98,841	104,147	98,765	112,052	101,211	74,040	65,475
SB Sumas	117,974	123,420	133,648	148,616	131,455	136,807	157,998	155,155	135,677	131,898	128,249
NB Huntingdon	64,558	63,093	68,526	87,924	65,858	73,907	55,642	52,187	46,687	43,286	47,601

Chart 4, above, provides a disaggregate view of annual truck volume at the three individual crossings, by direction, where trucks are allowed to cross. All crossing points share the same colour. Northbound trend lines include diamond shape markers. Southbound trend lines have no markers.

To explain the volume trends' relative position, it is important to remember the operational differences among the three crossing locations (more detail in the previous section, *Cascade Gateway system supply*).

Pacific Highway: The main commercial crossing serving the BC Hwy 99 – US I-5 corridor. This is where, on average 68 percent of the Cascade Gateway freight crosses. In both directions it is a full service commercial crossing open 24 hours a day.

Lynden, WA – Aldergrove, BC: In both directions, this crossing is open from 08:00 until 24:00. The U.S. operates the Lynden port as a permit-port for freight—limiting eligible commercial vehicle movements to those with a permit, empty-trucks, and trucks carrying low-value goods (informal entries). While CBSA's Aldergrove facility is not a DCO (Dedicated Commercial Operation), it has not, until this last August (2009) instituted parameters around which trucks and shipments may use the crossing. As part of ongoing decision making concurrent with an upcoming station replacement there, CBSA has started requiring that trucks have a letter of authorization from the District Director in order to cross at Aldergrove. The above data is not current enough to assess effects of this change.

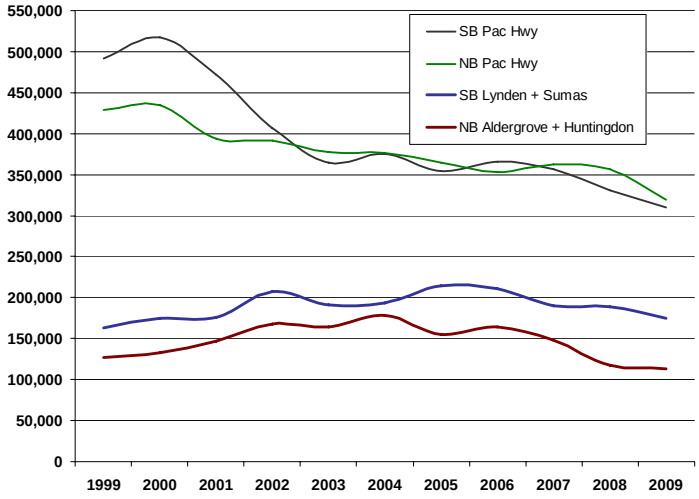
Sumas, WA – Huntingdon, BC:

In both directions, Sumas-Huntingdon is open 24 hours a day and is a passenger and commercial port-of-entry. Sumas and Huntingdon are also where livestock inspections are typically performed if needed (this can be a routing determinant for certain shipments of live animals). The data plotted in Chart 4 shows a significant discrepancy between northbound and southbound truck counts here. Over the 11-year period, annual directional totals differ by between 83 and 204 percent (and between 53,000 and 103,000 trucks in absolute terms).

Typically, the consistently higher southbound volume is attributed to diversion caused by the permit-port constraint at the Lynden port of entry – and that assessment makes sense. But over the 11 year period, a comparison of the annual NB-SB difference at Aldergrove-Lynden with the annual SB-NB difference at Sumas-Huntingdon, shows that, on average, only 44 percent of the higher volume at Sumas can be attributed to permit-induced diversion. That leaves 56 percent of the difference relatively unexplained. If this is a function of counting error, this is a potential problem for regional efforts to forecast freight traffic on these routes.

This count discrepancy is shown from a similar perspective in Chart 5 at right. To control for route diversion induced by permit requirements, the combination of Lynden and Sumas (SB ports) truck volume are compared with the combined annual volume of Aldergrove and Huntingdon. The single-location directional totals for Pacific Highway are also plotted. While Pacific Highway volumes track fairly well after 2001, combined directional totals for the other two crossing locations show a consistently large gap.

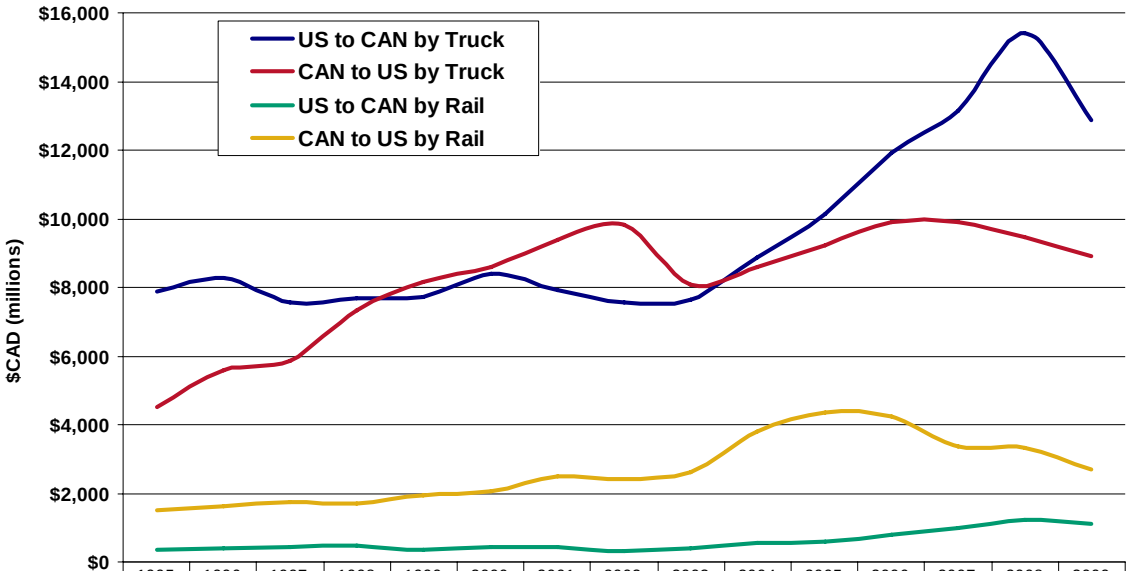
Chart 5: Volumes comparison – Pacific Highway Directional Volumes vs. Combined Lynden & Sumas SB Volumes and Aldergrove and Huntingdon NB Volumes. 1999 -2009



Cascade Gateway annual trade measures

As initially shown in the previous transportation demand overview section, the following trade data comes from the U.S. Department of Transportation's Bureau of Transportation Statistics (BTS).

Chart 6: 1995-2009 Cascade Gateway Trade Value, Adjusted for Inflation, by Direction, for Trucks and for Rail.



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
US to CAN by Truck	$7,899	$8,268	$7,579	$7,697	$7,740	$8,391	$7,938	$7,547	$7,643	$8,890	$10,120	$11,916	$13,134	$15,413	$12,883
CAN to US by Truck	$4,525	$5,577	$5,861	$7,320	$8,147	$8,587	$9,403	$9,822	$8,090	$8,594	$9,215	$9,895	$9,889	$9,469	$8,903
US to CAN by Rail	$365	$390	$425	$466	$357	$428	$419	$330	$404	$538	$594	$801	$1,002	$1,241	$1,123
CAN to US by Rail	$1,486	$1,617	$1,735	$1,698	$1,940	$2,045	$2,490	$2,434	$2,613	$3,790	$4,338	$4,257	$3,374	$3,327	$2,688

While BTS does not have railcar counts or number of trains, it does have data on trade value for both the rail and truck modes. One of the easiest things to spot looking at Chart 6 is the consistently higher share of trade value crossing the region's borders by truck. Second is the somewhat consistent amount (except for 2004-2006) by which regional Canadian rail exports have led regional U.S. rail exports.

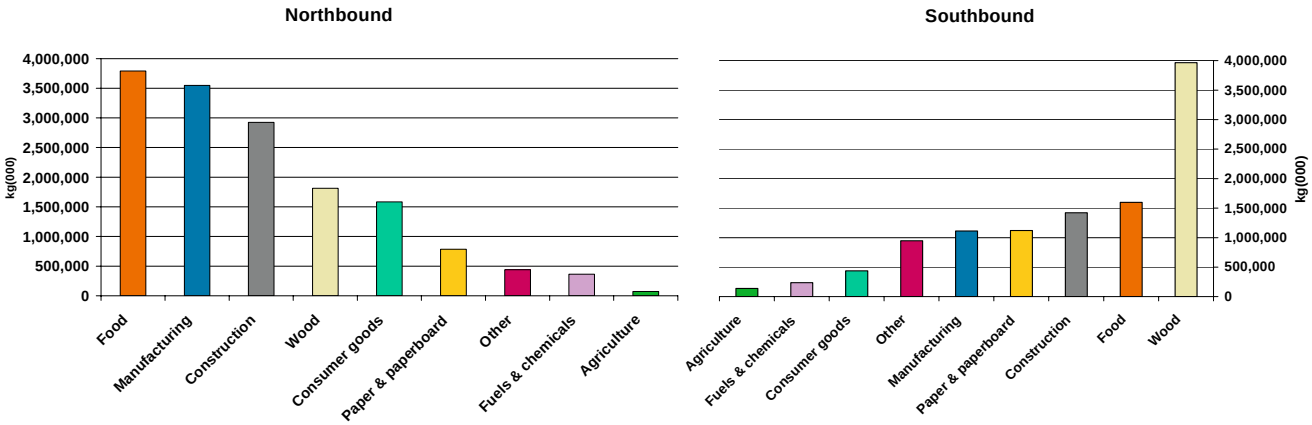
BTS Trade data is also available by weight but only for U.S. imports. However conversion factors have been prepared by BTS for estimating weight from value data by commodity. Since this is only available for years 2008 and 2009, this level of detail will be covered in the next section.

Cascade Gateway three-year aggregate truck commodity flow

While subsequent analysis will get into more detail on specific commodity classifications, Charts 7 and 8 below summarize the regional northbound and southbound truck commodity flows at a more general and probably more tangible level. Notes and observations include the following.

- In this aggregation (of 98 coded categories) food may be covering a substantial amount of what is typically considered to be agriculture. Agriculture here is limited to livestock and live plants. However, the vast majority of agricultural goods are food items (produce) ready for retail.
- A reminder that this is *not* truck-based data. A very large share of the trucks crossing the border is empty in one direction (currently around half southbound and less than that northbound).
- Corresponding truck counts are more directly a function of weight than they are of value. So, the expectation would be that most loaded trucks entering the United States from British Columbia are carrying wood products.
- The flow of goods through the Cascade Gateway reflects trade in a traditional sense as much as it represents inputs moving through a globally distributed production cycle towards world consumers. The flow includes a very heavy flow of raw material (wood) moving south in contrast to more finished and semi-finished goods (food, manufacturing & construction goods) moving north. Within this mix there are also consumer goods and finished manufactured goods which are moving from and between distribution modes and distribution points in more balanced amounts (ex. paper and fuels & chemicals).

Charts 7 & 8: Distribution of commodities in total, truck-borne freight flow by weight (kg 000) – Cumulative 2007-2009



Three year close-up: monthly detail and commodities

In 2008, BTS increased the level of detail in its trade data to enable monthly views of commodity detail at the port level. Previously the highest resolution view on commodity flow was state level (state of border crossing location). The following sections will examine data for commodity, value, weight, and truck count data.

U.S. export value by truck

Chart 7 (next page) shows almost four years (Jan. '07 – Sep. '10) of monthly, truck-borne, U.S. exports through the three Cascade Gateway commercial ports, by value (thousands of $USD). Commodities are classified at the two-digit level of the Harmonized Tariff Schedule (HTS). At the two-digit level, there are 98 classifications. For the summary here, the data has been sorted in descending order of total value over the 20-month period. The highest percentage-value commodities which together comprise 80 percent of total value, are plotted individually (21 categories). The remaining 77 commodity categories are grouped and plotted as a combined "other."

A review of Chart 7 leads to the following observations:

- In value terms, truck borne U.S. exports to Canada through the Cascade Gateway are a very diverse commodity flow. The multitude of low value shipments, when taken together, is consistently the highest ranking value category.
- Focused on a time frame split between continued growth in regional U.S. export value and U.S. and Canadian export decline (2008-present recession), two large-share commodity groups show deeper, sustained drops – machinery and vehicles. The "other" category drops towards the end of 2008 but makes a quicker comeback – perhaps like any well diversified portfolio. Electronic equipment's behavior looks more seasonal than recessionary.
- An un-plotted (off the chart) month (July '10) for electrical equipment (the monthly value ($400,000,000) is perhaps an error in the BTS data.

Canadian export value by truck

Chart 8 (page 15) presents the same information as Chart 7 for Canadian exports. Observations include the following:

- With Canadian truck-borne exports through the Cascade Gateway, the cumulative value of low-percentage commodities (which combined comprise 20 percent of total value) is also the consistently highest-value "category" – indicating that the overall goods mix is, like trade in the opposite direction, very diverse.
- While a diverse commodity mix (in value terms), there are some notable comparisons and contrasts. Machinery is the only high-percentage category that moves in both directions. Machinery also exhibits a similar recessionary trend as the U.S. machinery export trend.
- Follow-up discussions with CBP indicate that Special Class Provisions is a category predominately filled by US goods that are being returned from Canada. Goods movements in this category are not required to give additional commodity information on entry documents. CBP clarified though that no single commodity type dominates this tariff schedule code.
- Wood, fish, and "special class provisions" show similar spikes in mid 2010.
- With the exception of some directionally distinct high-percentage value commodities, the relative similarity of regionally transported commodities is notable. All of the two-digit groupings on the Canadian export list, with the

exception of "special class," also appear on the U.S. export list. Toys & sports equipment and mineral fuels are the relatively un-matched U.S. exports.

U.S. export weight by truck

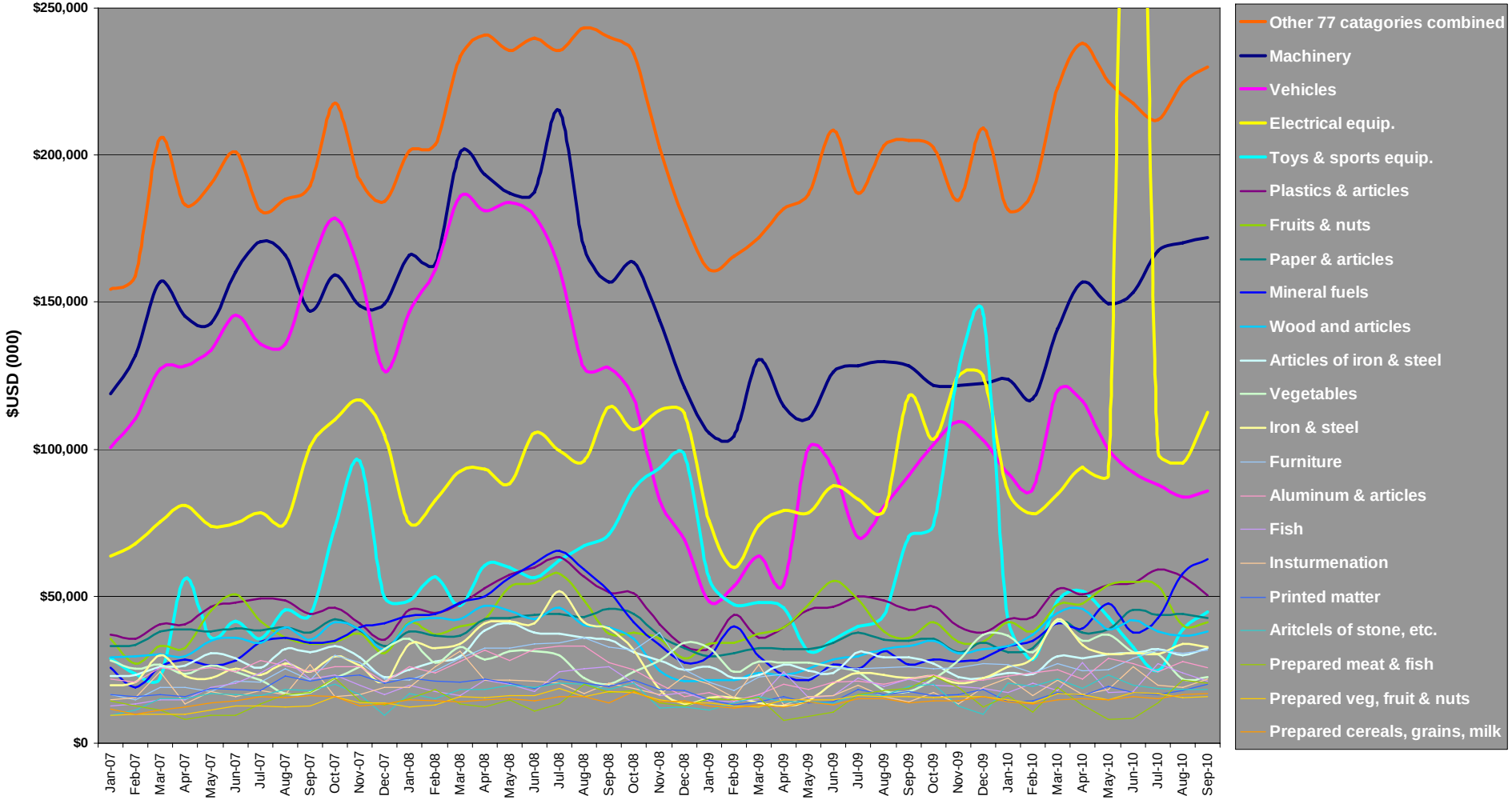
Evaluating the commodity flow in terms of weight should give a better indication of corresponding truck volume. US BTS does not collect weight data on U.S. exports. However, BTS does compile annual, commodity specific conversion estimates of value-to-weight equivalencies. These estimates have been obtained from BTS for 2007, 2008, and 2009. So, unlike the previous value-based charts and the Canadian export weight chart to follow, U.S. export weight is not plotted for the first nine months of 2010.

Chart 9 portrays U.S. exports via the Cascade Gateway by commodity, by weight (in thousands of kilograms). As for the value charts, the commodities which comprise the top 80 percent of total export weight over the time frame are listed individually. The remaining commodities are grouped in the "other" category. When comparing the weight and value charts, the "other" category is not entirely the same subset of commodities.

Some observations regarding these regional commodity weight trends are:

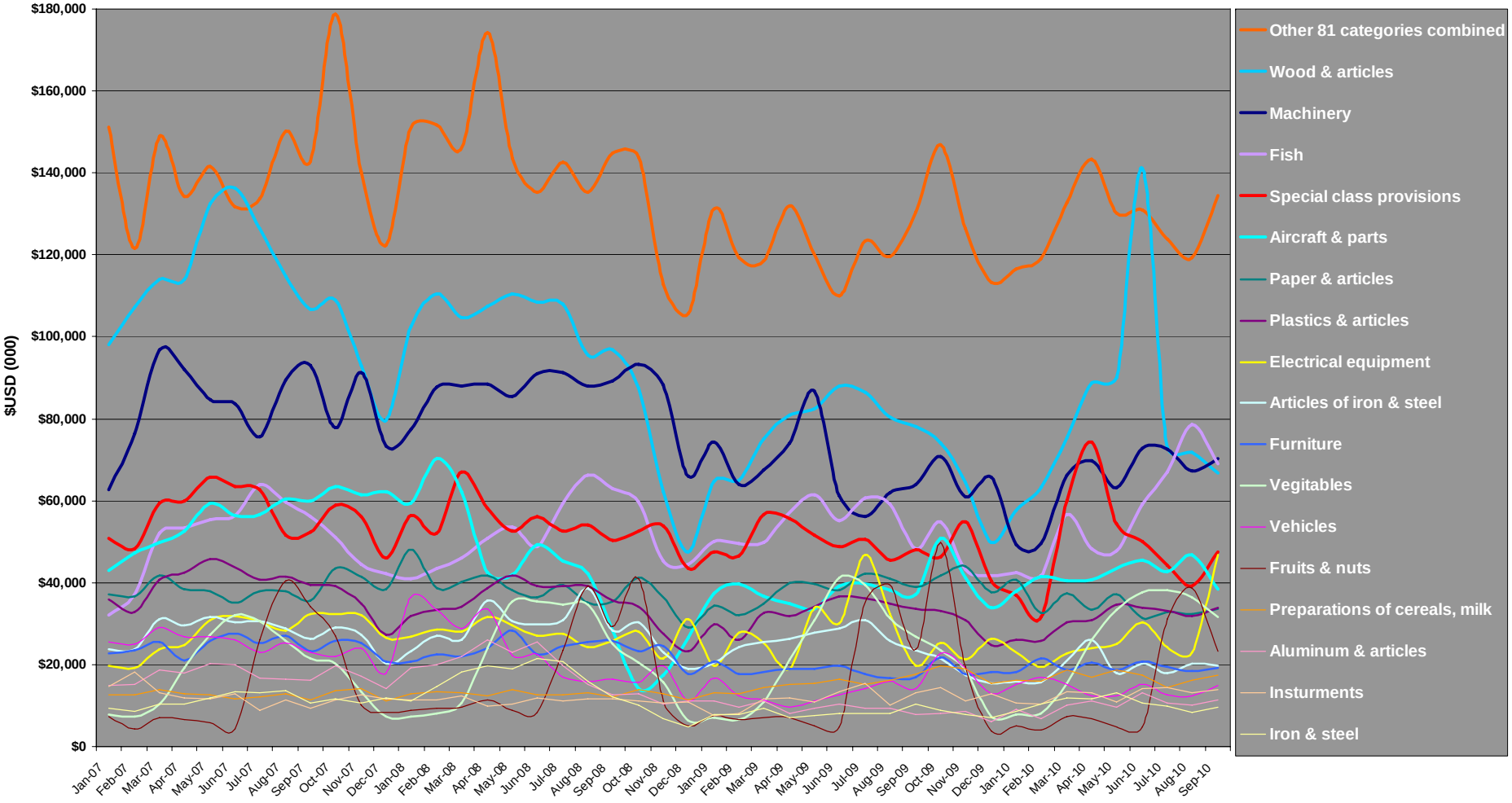
- As with U.S. exports expressed in value terms, the relatively small-share commodities which combined constitute the bottom 20 percent of total flow, are also the consistently heaviest "category" by a large margin. This leads to a general conclusion that commodity based drivers of transportation demand are not concentrated in a few sectors. Regional, cross-border freight transportation demand is diversified.
- The flow of commodities by weight exhibits a mix of seasonal flows and flows more affected by other factors. The combined "other" category looks roughly seasonal the first two years but then in 2009 looks to be starting from a recession-related low. Wood, mineral fuels, and iron & steel do not show clear seasons. They all show a strong downward response to the 2008 recession and very different upturns in 2009.
- The salt, earths, plaster commodity group (here probably comprised primarily of gypsum wallboard) has similarly modest showings in 2007 and 2009 with a large and sustained surge through 2008. This could be building materials related to the Olympic Games buildup. If that's the case though, the response is much stronger than for other construction related commodities.
- Vehicles show a recession related downturn but these are likely driven under their own power rather than loaded onto large trucks. So, the relationship of this commodity to large truck traffic needs to be better understood.
- Machinery, while the highest *value* commodity-group US export through the Cascade Gateway is thirteen down the list in weight. This is a strong example (along with toys and electrical equipment) of high value categories that generate proportionately little truck volume.

Chart 9. 2007-Sep. 2010, Monthly, truck-borne, U.S. exports via the Cascade Gateway, by commodity (2-digit HTS), by value (thousands of adjusted 2000 $USD).



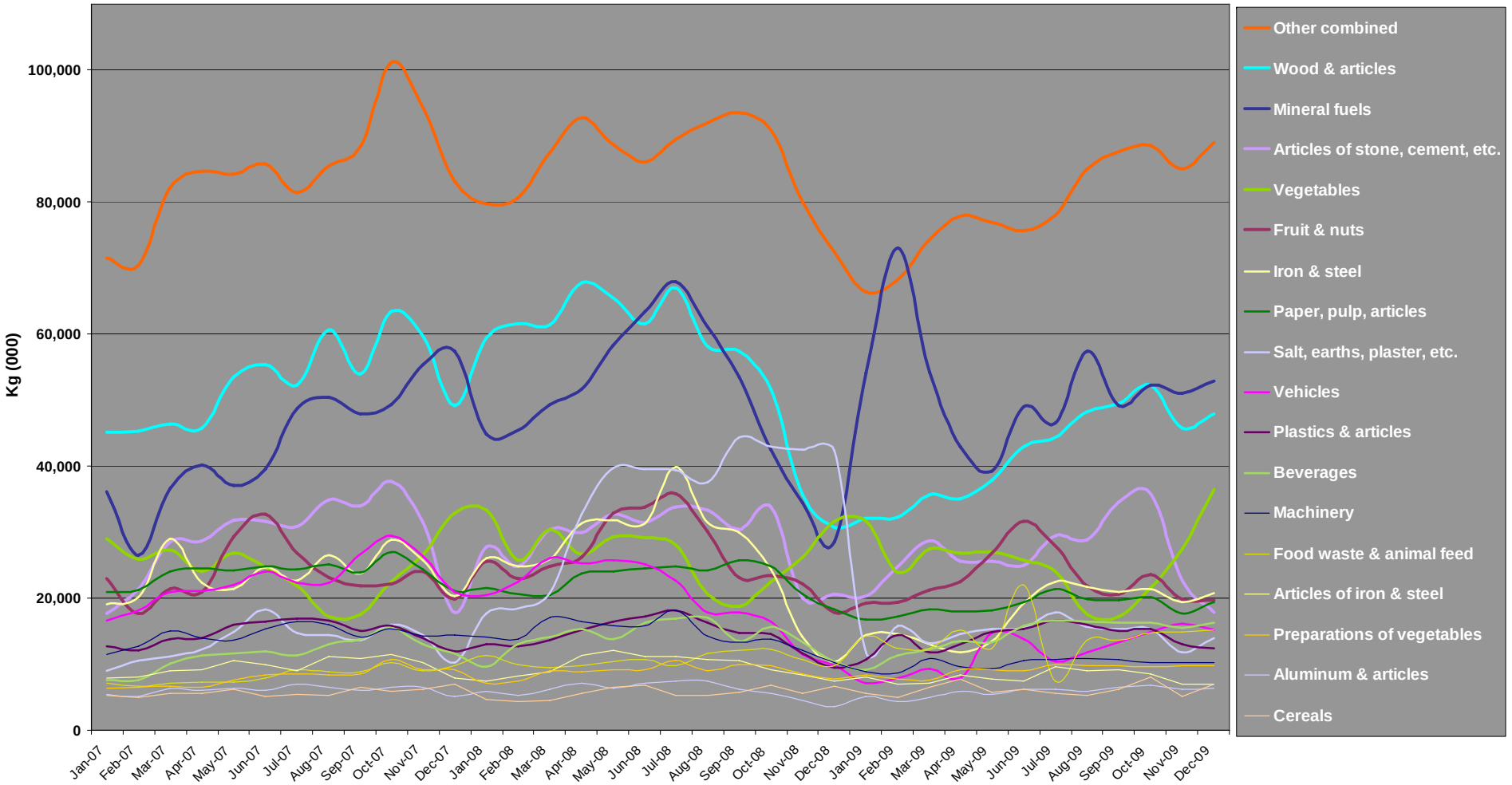
Data sources: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Transborder Surface Freight Database, U.S. Bureau of Labor Statistics.
Compiled by: Whatcom Council of Governments

Chart 10. 2007-Sep. 2010, Monthly, truck-borne, CANADIAN exports via the Cascade Gateway, by commodity (2-digit HTS), by value (thousands of adjusted 2000 $USD).



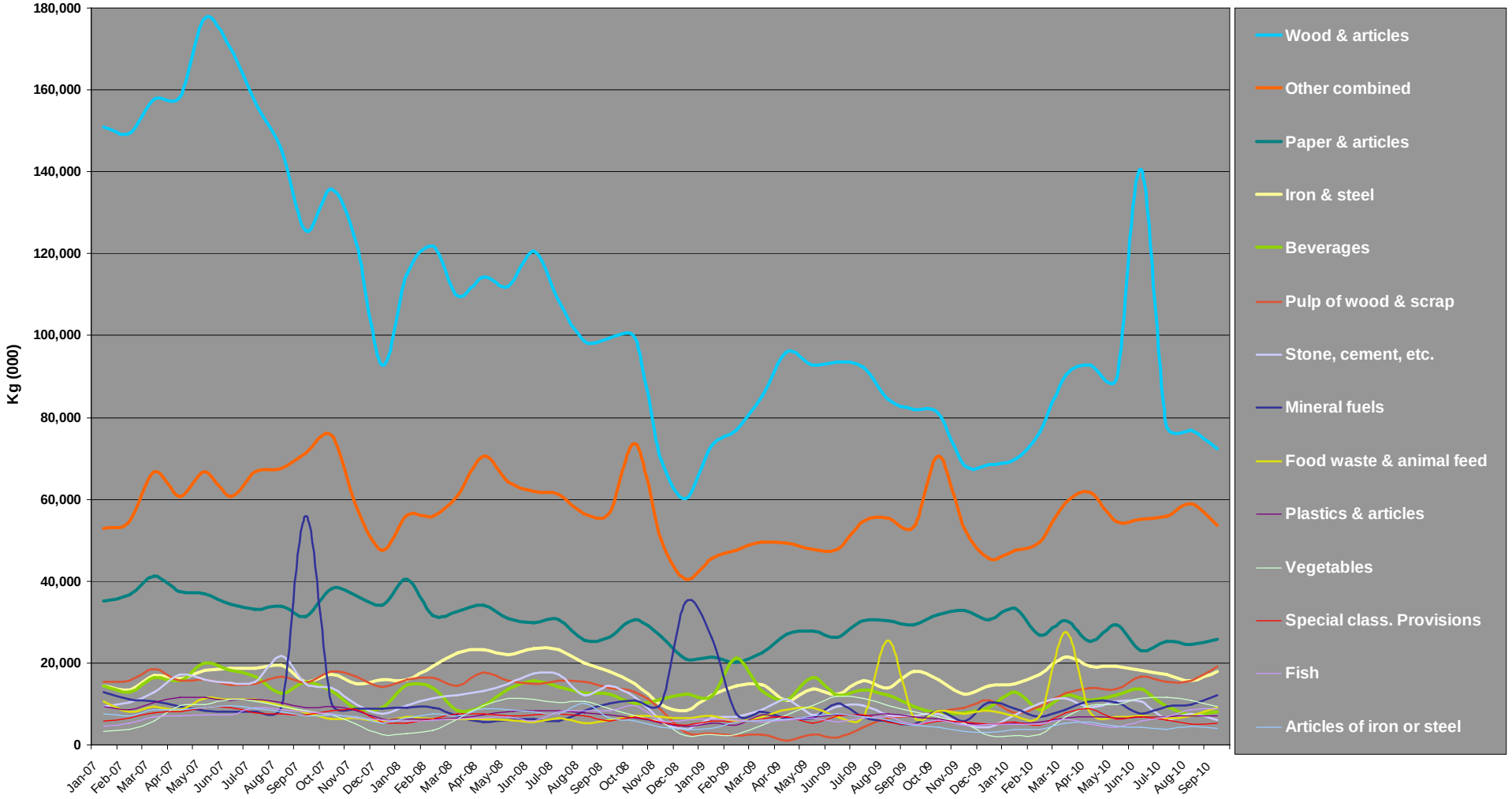
Data sources: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Transborder Surface Freight Database, U.S. Bureau of Labor Statistics.
Compiled by: Whatcom Council of Governments

Chart 11. 2007-Sep. 2010, Monthly, truck-borne, U.S. exports via the Cascade Gateway, by commodity (2-digit HTS), by weight (thousands of kilograms).



Data sources: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Transborder Surface Freight Database, U.S. Bureau of Labor Statistics.
Compiled by: Whatcom Council of Governments

Chart 12. 2007-Sep. 2010, Monthly, truck-borne, CANADIAN exports via the Cascade Gateway, by commodity (2-digit HTS), by weight (thousands of kilograms).



Data sources: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Transborder Surface Freight Database, U.S. Bureau of Labor Statistics.
Compiled by: Whatcom Council of Governments

Canadian export weight by truck

Chart 12 (page 18) presents the same information as Chart 11 for Canadian exports with the difference that BTS collects weight value directly. So, Chart 12 again plots month values from 2007 through September 2010. Observations include the following:

- Unlike the three previous charts, Canadian exports by weight show a clear single commodity category leader: wood – a commodity that is heavy *and* high-value.
- Viewed in weight, the Canadian wood export trends in the Cascade Gateway show that 1) demand for wood has a relatively higher impact on transportation demand and 2) a steep decline in U.S. consumption started much earlier than a similar decline in Canadian consumption of U.S. wood in the region.
- Looking for season patterns, the combined "other" category, along with vegetables, seem to have a similar annual profile and appear to have sustained consistency over the time period. A group of heavy commodities show recession troughs: Paper, pulp, iron & steel, and stone. Finally, a couple of commodity groups show erratic surges: mineral fuels and food waste & animal feed. These are perhaps volatile commodities with flexible consumers able to react more quickly to exchange-rate caused price differences.

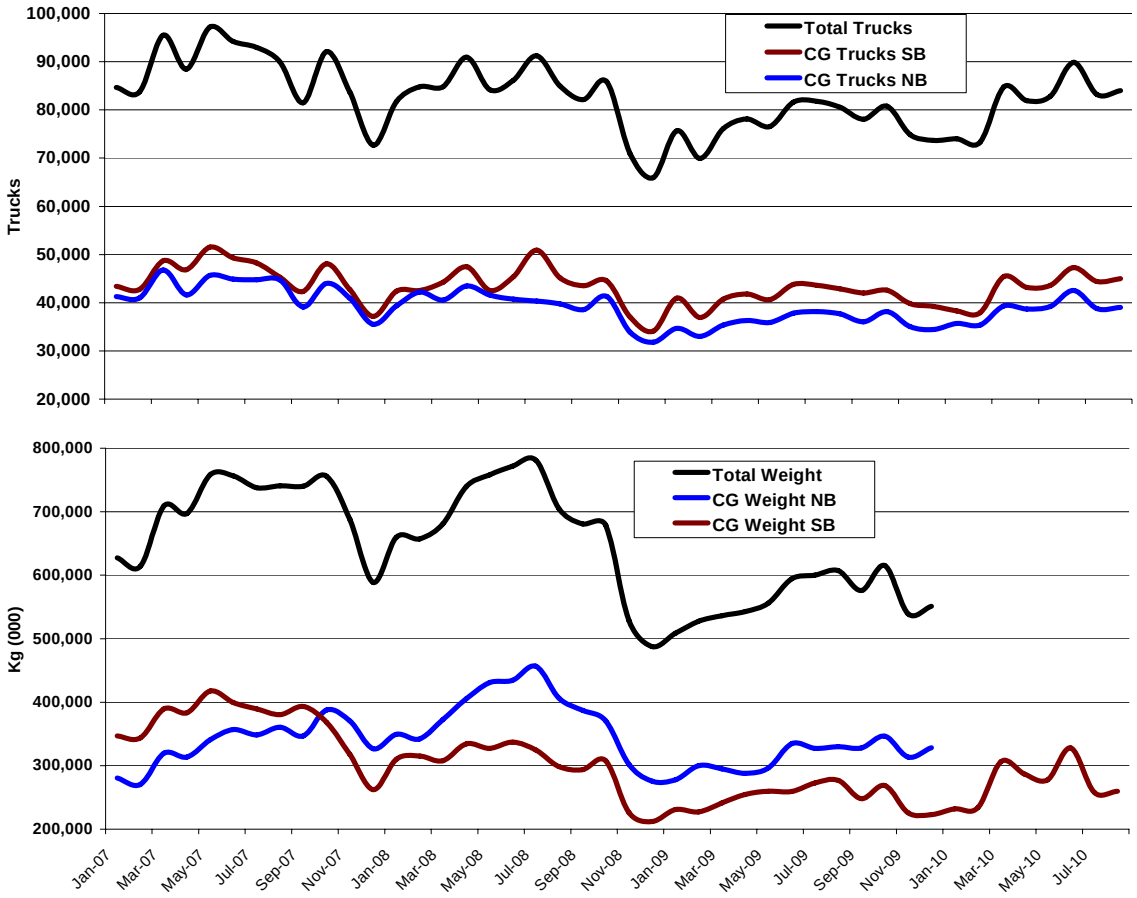
Total weight & trucks by direction

This section evaluates how well cross-border freight weight trends correspond to cross-border truck counts.

Chart 13 (page 20), stacks two graphs on a matching time-line: monthly truck *volumes* (northbound, southbound, and total) and monthly *weight* of cross-border shipments (northbound, southbound, and total). As a reminder, please note that U.S. export weight (CG Weight NB) is an estimated conversion from value – not directly reported. Because the sample-based conversion factors are not yet available for 2010, the "SB" and "Total" weight plots stop at December 2009. Observations include the following:

- When looking at the directional truck counts, the approximately 5,000 truck discrepancy is noticeable. With the exception of the July 2008 data-point, the two counts stay fairly consistent to one another.
- Interesting to note that 2007 starts with Canadian exports outweighing US exports but then ends the year reversed – a condition that has persisted.
- For the most part, changes in total freight weight occur in the same direction (positive or negative) with changes in truck volume. The first peak May-07 shows correspondence. Likewise for the troughs at Dec-08 and Dec-09.

Chart 13. 2007-August 2010, Monthly, truck-borne, Cascade Gateway cross-border freight weight (thousands of kilograms) and truck-counts, by month and by direction.



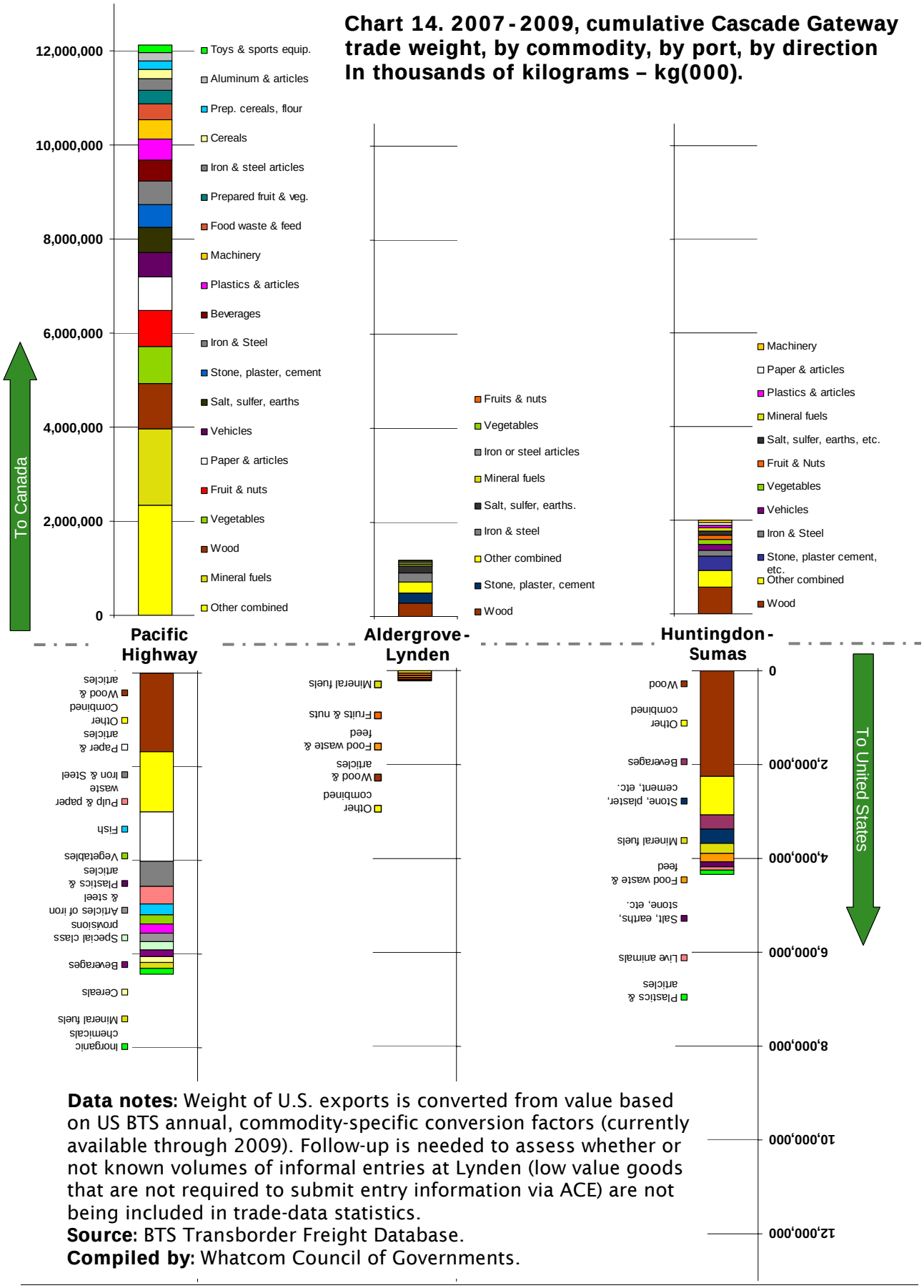
Data sources: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Transborder Surface Freight Database, U.S. Bureau of Labor Statistics.
Compiled by: Whatcom Council of Governments

Weight based commodity split compared across crossing by direction

To see the distribution of commodity flow across the three Cascade Gateway ports, by direction, Chart 14 uses stacked bar charts to depict three cumulative years of goods movement in total kilograms (northbound weights are estimated as explained on page 12). Observations include the following:

- Recent years; regional trade flow imbalance is obvious at Pacific Highway where northbound freight weight has been approximately double that of southbound. But overall, three-year weight-flow has been about 36 percent more northbound.
- The relative absence of southbound freight at Lynden is made clear. BTS data likely misses a significant flow of low-value goods such as animal feed and wood-waste used as low-cost fuel. Low value (<$2,500) shipments have significantly reduced entry documentation requirements and may be discounted in the data as a result.
- While there are some large-share commodities in the overall mix, wood is a clearly dominant flow southbound at Sumas where it is more than half the incoming freight weight and a larger absolute amount than at Pacific Highway. This is largely explained by the kiln-drying plants in Sumas, Washington.

Chart 14. 2007-2009, cumulative Cascade Gateway trade weight, by commodity, by port, by direction
In thousands of kilograms – kg(000).



Data notes: Weight of U.S. exports is converted from value based on US BTS annual, commodity-specific conversion factors (currently available through 2009). Follow-up is needed to assess whether or not known volumes of informal entries at Lynden (low value goods that are not required to submit entry information via ACE) are not being included in trade-data statistics.
Source: BTS Transborder Freight Database.
Compiled by: Whatcom Council of Governments.

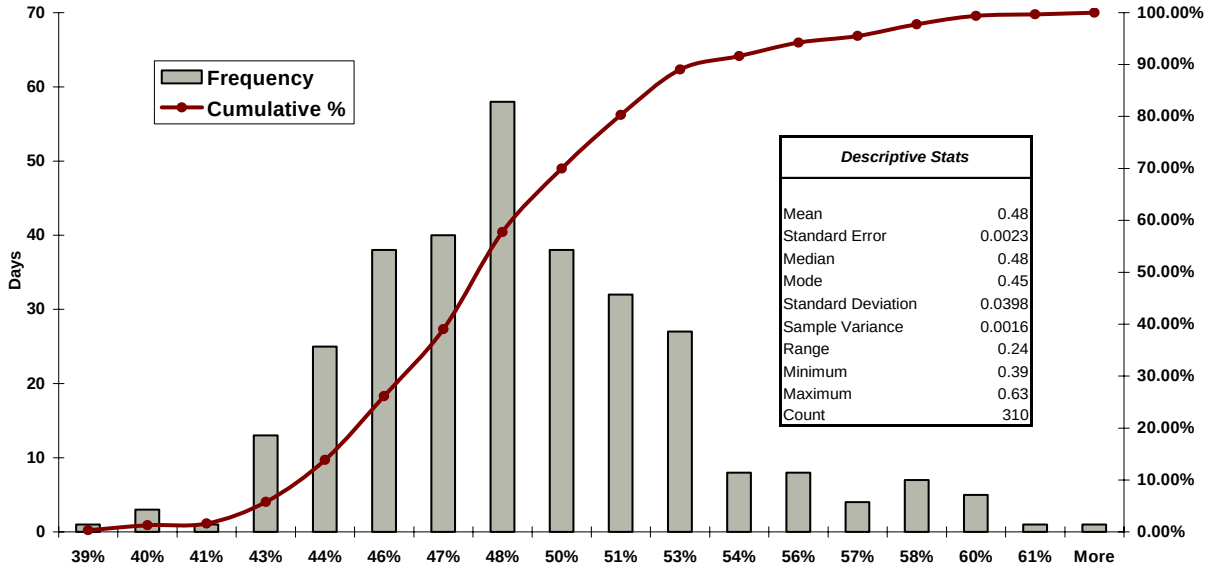
Empty trucks

The above sections (freight weight, freight value, etc.) have been based on trade data. Trade data is based on entry forms submitted for each shipment. Two things complicate the translation of this kind of data to vehicle-based measures of transportation demand. First, many trucks have more than one shipment on board – including shipments of significantly different commodity types. Second, many trucks are empty.

For a perspective on the amount of Cascade Gateway cross-border truck-traffic that is empty, two sources of data are reviewed below. First, recently available data from U.S. CBP includes empty-loaded designations as part of hourly counts extracted from ACE (Automated Commercial Environment) records. This type of information is not collected in the northbound direction.

Second, survey data from the IMTC Commercial Vehicle Operations Survey provides a sample-based profile of empty trucks by direction and other potentially informative cross-tabulations.

Chart 15. Frequency distribution of daily percentage of empty trucks, Pacific Highway, Southbound, December 2009 through October 2010.



Source: U.S. CBP, Blaine, WA.
Compiled by: Whatcom Council of Governments

Chart 15's summary of 310 days of recent southbound commercial traffic at Pacific Highway confirms and describes a high and consistent proportion of empty truck volume in the southbound direction.

Subsequent exhibits here seek evidence for variation in the empty-loaded share. Table 1(at right) breaks out the 2010 CBP data to discover how the ratio has differed by day of week.

Table 1. Pacific Highway Dec. '09-Oct'10 percentage of total and percentage empty trucks by day-of-week.

	Day-of-week's Percent Empty	Day-of-week's Percent of Total Commercial Traffic
Monday	51.07%	16.46%
Tuesday	46.51%	18.43%
Wednesday	44.76%	18.18%
Thursday	47.67%	17.26%
Friday	48.94%	15.76%
Saturday	47.72%	7.52%
Sunday	50.77%	6.38%

Tables 2 and 3 (next page) look at percentage of empty trucks southbound by month (2010) and by individual border crossing.

Table 2. Pacific Highway Dec. '09-Oct'10 percentage of empty trucks by month.

December	51.40%
January	48.48%
February	48.82%
March	47.45%
April	45.45%
May	46.96%
June	46.32%
July	48.23%
August	48.24%
September	48.39%
October	49.41%

Table 3 Cascade Gateway, port-specific percent empty trucks and ports' share of total trucks

Lynden, Southbound Trucks Dec. '09-Oct. '11.

	Percent of Trucks that were Empty at this Port	Port's Share of Cascade Gateway Southbound Trucks
Pacific Highway	47.89%	58.56%
Lynden	92.79%	10.71%
Sumas	40.31%	30.73%

Sources: US CBP, Blaine, WA.
Compiled by: Whatcom Council of Governments

Looking at the monthly summary view of southbound empty trucks, there does seem to be some pattern with a peak in empties in late fall, a low-point (although still significant share) in spring, and gradual movement down and up on either side of the spring trough.

The port-specific view accords with aspects of Cascade Gateway traffic distribution that have been discussed above. The U.S. port of entry at Lynden, while restricting cargo to carriers and shippers with permits, does allow empty trucks While the 93 percent figure is surprisingly high, follow-on consultation with CBP confirmed it's relative accuracy. These statistics underscores the importance of combining data sources (trade data, traffic data, and operational knowledge) to improve our understanding of overall demand on the system.

Sumas showing up as the lowest percent-empty port fits with the dominance of wood in the southbound commodity flow there. Most of that wood is likely destined for nearby kiln-drying operations.

2009 Cascade Gateway Commercial Vehicle Operations Survey

In June and July of 2009, the Whatcom Council of Governments (WCOG) and Western Washington University's Border Policy Research Institute (BPRI) collaborated with U.S. Customs and Border Protection (US CBP) and Canada Border Services Agency (CBSA) to conduct an observational survey of commercial-vehicle movements to and through the federal border inspection facilities as well as vehicle and trip characteristic data. This project, in many ways a third undertaking of periodic efforts to track changes to operations and processing, was identified and supported by the International Mobility and Trade Corridor Project (IMTC). More information on the study is available at http://www.wcog.org/Border/IMTC-Projects/CVO-Border-Evaluation-Study/288.aspx

While a lot of the effort undertaken in the 2009 CVO survey was aimed at measuring operational dynamics of throughput and inspection times, observations extracted for this sector profile paper will focus on the data related to carriers and to freight. Summaries of operational assessments will be treated under *Cascade Gateway System Performance*.

Background information

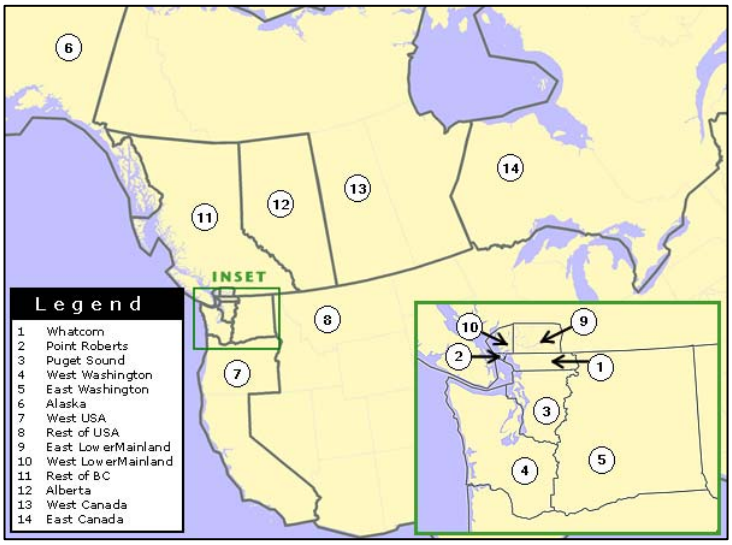
This effort made contact with practically every truck during the survey schedule. Thus, while hourly traffic counts were obtained for each day data was collected, this data has been used to validate record totals and give context rather than to develop expansion factors.

Table 4. 2009 CVO Survey – data collection schedule

TRUCK PROCESSING		
Pacific Highway	Northbound	June 15 & 16, 9:00am - 1:30pm; June 24 & 25, 1:30pm - 9:00pm
Pacific Highway	Southbound	June 17 & 18, 9:00am - 1:30pm; June 22 & 23, 1:30pm - 9:00pm
Lynden/Aldergrove	Northbound	July 8 & 9, 8:00am - 9:00pm
Lynden/Aldergrove	Southbound	July 1 & 2, 8:00am - 9:00pm
Sumas/Huntingdon	Northbound	July 6 & 7, 8:00am - 9:00pm
Sumas/Huntingdon	Southbound	June 29 & 30, 6:00am - 9:00pm
PACIFIC HIGHWAY BUSES		
	Northbound	July 4, 9:00am - 2:00pm; July 10, 9:00am - 3:00pm
	Southbound	July 3, 9:00am - 2:00pm; July 11, 9:00am - 3:00pm
24 HOUR BOOTH DATA COLLECTION		
	Both Directions	July 12 - July 19

Cross-border truck origin & destination summaries

In 2000, when IMTC advanced its first large scale freight and passenger intercept survey, origin and destination data was analyzed at a super-zone level as well as city-level. For higher-level summarization, the zone structure shown at right has continued to be used. It is applied below to portray 2009 origin-destination matrices for each of the three commercial Cascade Gateway border crossing in both directions



These summaries reflect the origin and destination stated by the truck driver for the truck trip they were currently making – loaded or empty. These tables show the stated origin and destination of the truck – not necessarily the final destination of the goods.

Table 5. Origin-Destination Matrix, Pacific Highway, Southbound (summer 2009)

	Destination Regions											
Origin Region	**Alberta**	**East Canada**	**East Lower Mainland**	**East Washington**	**Puget Sound**	**Rest of USA**	**West Canada**	**West Lower Mainland**	**West USA**	**West Washington**	**Whatcom County**	
Alaska											0.1%	**0.1%**
Alberta				0.1%	0.1%					0.4%		**0.6%**
East Canada				0.1%	0.4%				0.3%			**0.7%**
East Lower Mainland				0.4%	2.2%	0.8%			2.0%	1.1%	2.4%	**8.9%**
East Washington											0.1%	**0.1%**
Point Roberts					0.1%				0.1%		0.8%	**1.0%**
Puget Sound								0.4%				**0.4%**
Rest of BC				0.1%	0.4%	0.5%			0.6%	0.3%	0.4%	**2.3%**
Rest of USA	0.1%							0.2%				**0.3%**
West Canada					0.2%				0.1%			**0.3%**
West Lower Mainland		0.1%	0.1%	3.3%	22.2%	4.5%		0.1%	18.2%	11.7%	23.5%	**83.7%**
West USA	0.1%		0.1%					0.4%				**0.6%**
West Washington						0.1%	0.1%	0.2%				**0.4%**
Whatcom County								0.6%			0.1%	**0.7%**
	0.1%	**0.1%**	**0.2%**	**3.9%**	**25.6%**	**5.9%**	**0.1%**	**2.0%**	**21.3%**	**13.4%**	**27.4%**	**100.0%**

Table 6. Origin-Destination Matrix, Pacific Highway, Northbound (summer 2009)

	Destination Regions											
Origin Region	Alberta	East Canada	East Lower Mainland	Point Roberts	Puget Sound	Rest of BC	Rest of USA	West Canada	West Lower Mainland	West Washington	Whatcom County	
East Canada			0.1%									0.1%
East Lower Mainland			0.1%						0.1%		0.1%	0.3%
East Washington			0.4%			0.2%			1.6%			2.1%
Puget Sound	0.4%	0.5%	1.6%	0.1%	0.1%	1.0%			20.1%	0.1%		23.9%
Rest of USA	0.1%		1.8%			0.4%		0.1%	5.5%	0.1%		7.9%
West Lower Mainland					0.3%		0.1%		0.1%		0.1%	0.6%
West USA	0.2%		3.2%			0.6%			13.2%		0.1%	17.3%
West Washington	1.2%		1.6%	0.1%		0.7%			16.6%			20.3%
Whatcom County	0.1%	0.1%	2.7%	0.7%		0.6%	0.1%		23.1%			27.5%
	2.1%	0.6%	11.5%	1.0%	0.4%	3.5%	0.1%	0.1%	80.3%	0.1%	0.4%	100.0%

For the Pacific Highway border crossing (tables 5 & 6), observations include the following:

- West Lower Mainland BC is the dominant Canadian trip-end for trucks using this crossing. In accordance with the relative commercial geography, trip-ends in the United States are more varied and show meaningful shares much farther from the border. Still, the trucks at this crossing are shown to be serving a primarily West Coast trade lane. Almost 30 percent of this traffic circulates in the border-region (between the BC Lower Mainland and Whatcom County, WA). The remaining 70 percent of traffic transiting beyond the border region underscores the crossings' importance to supra-regional and national trade flows.

Table 7. Origin-Destination Matrix, Lynden, Southbound (summer 2009)

	Destination Regions								
Origin Region	East Lower Mainland	East Washington	Puget Sound	Rest of USA	West Lower Mainland	West USA	West Washington	Whatcom County	
Alaska			0.4%	0.4%					0.8%
East Canada						0.4%			0.4%
East Lower Mainland		2.7%	10.0%	1.1%	0.4%	3.8%	3.4%	31.0%	52.5%
East Washington	0.4%								0.4%
Point Roberts								1.5%	1.5%
Rest of BC		0.4%	1.5%	0.8%		0.4%		1.5%	4.6%
West Lower Mainland	0.4%	0.4%	8.4%	1.5%		1.1%	1.5%	24.5%	37.9%
Whatcom County	0.8%		0.4%					0.8%	1.9%
	1.5%	3.4%	20.7%	3.8%	0.4%	5.7%	5.0%	59.4%	100.0%

Table 8. Origin-Destination Matrix, Aldergrove, Northbound (summer 2009)

	Destination Region						
OriginRegion	Alaska	Alberta	East Lower Mainland	Point Roberts	Rest of BC	West Lower Mainland	
East Washington			1.3%			3.0%	4.2%
Puget Sound	0.4%		22.9%		0.4%	9.7%	33.5%
Rest of USA	0.4%		1.3%			0.4%	2.1%
West USA	0.4%	0.8%	8.1%			10.2%	19.5%
West Washington			5.1%			4.7%	9.7%
Whatcom County			19.5%	0.8%	1.7%	8.9%	30.9%
	1.3%	0.8%	58.1%	0.8%	2.1%	36.9%	100.0%

For the Lynden & Aldergrove border crossings (tables 7 & 8), observations include the following:

- A very dominant share (59 percent) of southbound trucks here, are not driving beyond Whatcom County.
- In accordance with CBP's long-standing permit requirement for southbound cargo here, the diversity of U.S. trip ends is greater for northbound trucks. (**Note:** *this summary is based on data that pre-dates CBSA's August 2010 authorization-letter requirement for northbound trucks at Aldergrove which could generate a similar effect*.)
- Generally, the Lynden-Aldergove location, at the center of the Cascade Gateway, serves a large share of British Columbia trip-ends in *both* East and West Lower Mainland.

Table 9. Origin-Destination Matrix, Sumas, Southbound (summer 2009)

	Destination Regions								
Origin Region	**East Lower Mainland**	**East Washington**	**Puget Sound**	**Rest of USA**	**West Lower Mainland**	**West USA**	**West Washington**	**Whatcom County**	
Alaska			0.7%			0.4%		0.3%	**1.3%**
Alberta			0.8%			0.4%	0.7%	0.7%	**2.5%**
East Canada			0.1%						**0.1%**
East Lower Mainland	0.1%	1.7%	15.1%	4.1%	0.1%	11.2%	5.0%	27.8%	**65.3%**
East Washington	0.1%								**0.1%**
Puget Sound	0.1%								**0.1%**
Rest of BC		0.3%	1.5%	0.1%		1.3%	1.3%	4.0%	**8.6%**
West Canada		0.1%	0.3%			0.1%	0.3%	0.1%	**0.9%**
West Lower Mainland		0.4%	3.1%	1.3%		3.5%	2.1%	9.8%	**20.2%**
West USA					0.1%				**0.1%**
West Washington	0.1%								**0.1%**
Whatcom County	0.3%				0.1%				**0.4%**
	0.8%	**2.5%**	**21.6%**	**5.6%**	**0.4%**	**17.0%**	**9.4%**	**42.7%**	**100.0%**

Table 10. Origin-Destination Matrix, Huntingdon, Northbound (summer 2009)

	Destination Region									
OriginRegion	**Alaska**	**Alberta**	**East Lower Mainland**	**Puget Sound**	**Rest of BC**	**West Canada**	**West Lower Mainland**	**West USA**	**Whatcom County**	
East Lower Mainland			0.3%	0.3%					0.3%	**0.8%**
East Washington			1.0%		0.3%					**1.3%**
Puget Sound		2.0%	13.3%		0.8%	0.5%	1.0%			**17.6%**
Rest of BC									0.3%	**0.3%**
Rest of USA			1.0%		0.3%		1.0%			**2.3%**
West Lower									0.8%	**0.8%**
West USA		0.3%	4.3%		0.8%		1.0%			**6.4%**
West Washington		0.8%	7.1%		1.5%		1.3%			**10.7%**
Whatcom County	0.5%	2.3%	46.2%		2.6%	0.3%	7.9%	0.3%		**59.9%**
	0.5%	**5.4%**	**73.2%**	**0.3%**	**6.1%**	**0.8%**	**12.2%**	**0.3%**	**1.3%**	**100.0%**

For the Sumas and Huntingdon border crossings (tables 9 & 10), observations include the following:

- For both directions, the dominant flow is between East Lower Mainland and Whatcom County.
- While trip ends in the U.S. have a higher near-border, Whatcom County concentration, there is still significant flow to and from West Coast zones. However, there is noticeably more traffic destined *to* West USA than there is destined from that area. This, again, could indicate the effect of permit-restrictions at Lynden, shifting measurable, non-regional southbound traffic over to Sumas.

Commercial vehicle types

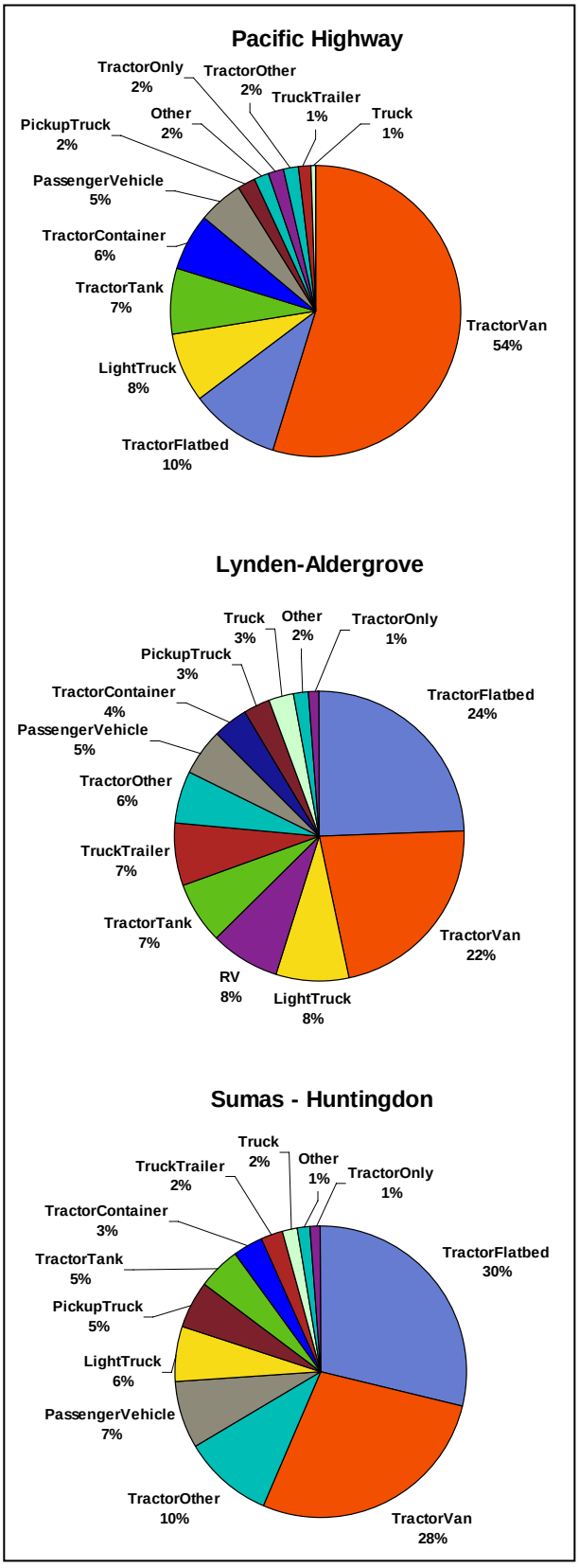
The distribution of vehicle types moving through the Cascade Gateway can provide important information relative to the commodities being shipped, the types of carrier firms likely involved, the types of facilities and transfer stations at truck-trip ends, likelihood for mode shift, and more.

Chart 16 at left shows the distribution for each of the three crossing locations (directionally combined). Again, this information is based on a sample of trucks moving through the regional border—inclusive of empties as well as loaded trucks. Observations include the following:

- Tractor vans are the dominant truck type especially given the higher absolute vehicle volume at Pacific Highway.
- Tractor-flatbed trucks show up in twice and three times the proportions at Sumas-Huntingdon and Lynden-Aldergrove respectively. This matches well with the preponderance of wood products at Sumas.
- Recreational vehicles (RVs) are frequently directed through the truck lanes at Lynden.
- At Lynden-Aldergrove and Sumas-Huntingdon, *Tractor Other*, *Passenger Vehicles*, and *Truck Trailer* shift into top-5 rankings. *Tractor Other* is likely more specialized equipment related to bulk commodities. *Truck Trailer* is likely related to small volume agricultural shipments. *Passenger Vehicles* are typically engaged in transactions at the U.S. post office in Sumas.

Commodities' relation to vehicle

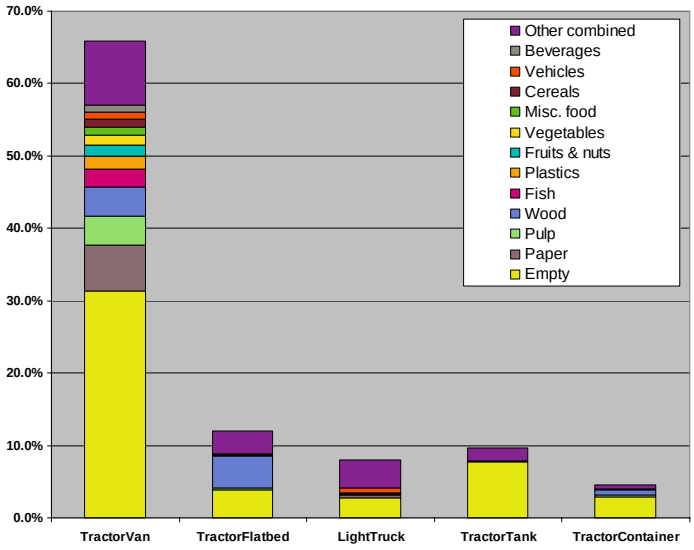
Chart 16: Cascade Gateway Vehicle Type distribution by Port of Entry. (2009 IMTC survey)

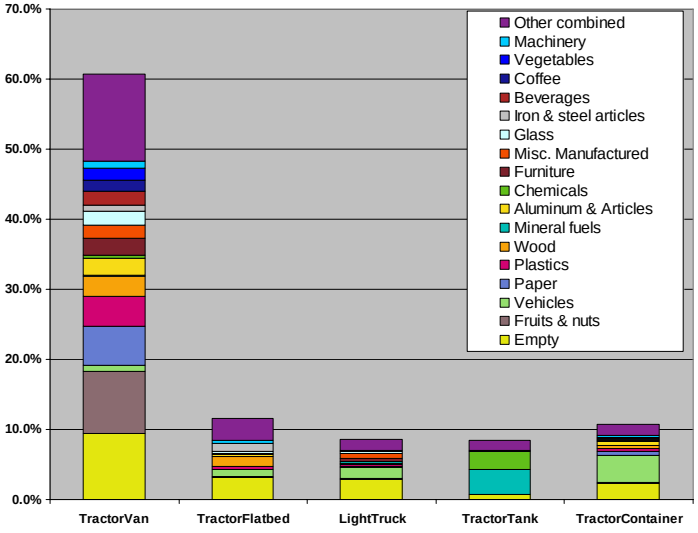


types

Focusing in on Pacific Highway, Charts 17 and 18 take the top-five vehicle types and examine the commodities on board. (Note: these five vehicle types comprised 85 percent of the two-way traffic at this port). Observations include the following:

Chart 17 Pacific Highway **Southbound** – Distribution of Commodity Groups among Selected Vehicle Types.





- The only vehicle type with a dominant southbound commodity (other than empty) is tractor-flatbed's connection with wood (although only slightly fewer tractor-vans are loaded with wood).
- In both directions, the dominant vehicle type, tractor vans, carries a diverse range of commodities.
- Tractor vans have an almost exclusive relationship with food-related commodities (beverages, cereals, fruit & nuts, etc.) which, taken together, are about 9 percent of tractor-van movements southbound and 15 percent northbound.
- Tractor-tanks are the most empty southbound vehicle type and have the least diverse associated commodities being primarily northbound mineral fuels and chemicals.
- The data on tractor-containers (intermodal containers on trucks) is interesting. A larger percentage of the northbound flow is comprised of containers and most of the southbound containers are empty. This seems to align with a scenario of containers arriving at marine ports in the U.S. being trucked to BC, and then being returned empty.
- The dominant commodity of northbound tractor-containers, generally labeled "vehicles," is auto parts.

Truck base location

Conventional wisdom in the region is that, especially over the last ten years, what used to be a more balanced population of both Canadian and U.S.-based trucks has shifted towards a preponderance of BC-based carriers. While an historical review of available data on this metric is not being undertaken here, the typical reason given for this shift is geographic – because U.S. carriers have more options to carry goods domestically, they have increasingly abdicated the cross-border trade-lanes to Canadian firms who cannot afford to forgo cross-border work in a country where 90 percent of the population lives within 160 kilometers of the U.S. border. Data from the 2009 IMTC Cascade Gateway commercial vehicle survey certainly confirms generalizations about the nationality of carriers.

Table 11. Distribution of cross-border trucks by base location and by port of entry (June 2009 IMTC commercial vehicle survey)

	Pacific Highway	Lynden - Aldergrove	Sumas Huntingdon	Total Cascade Gateway
Canada total	**64.6%**	**58.9%**	**68.0%**	**64.8%**
BC	57.6%	55.5%	64.2%	58.9%
Other Canada	7.0%	3.4%	3.9%	5.9%
US total	**35.4%**	**41.1%**	**32.0%**	**35.2%**
WA	18.3%	30.1%	24.1%	20.9%
Other U.S.	17.1%	11.0%	7.9%	14.3%

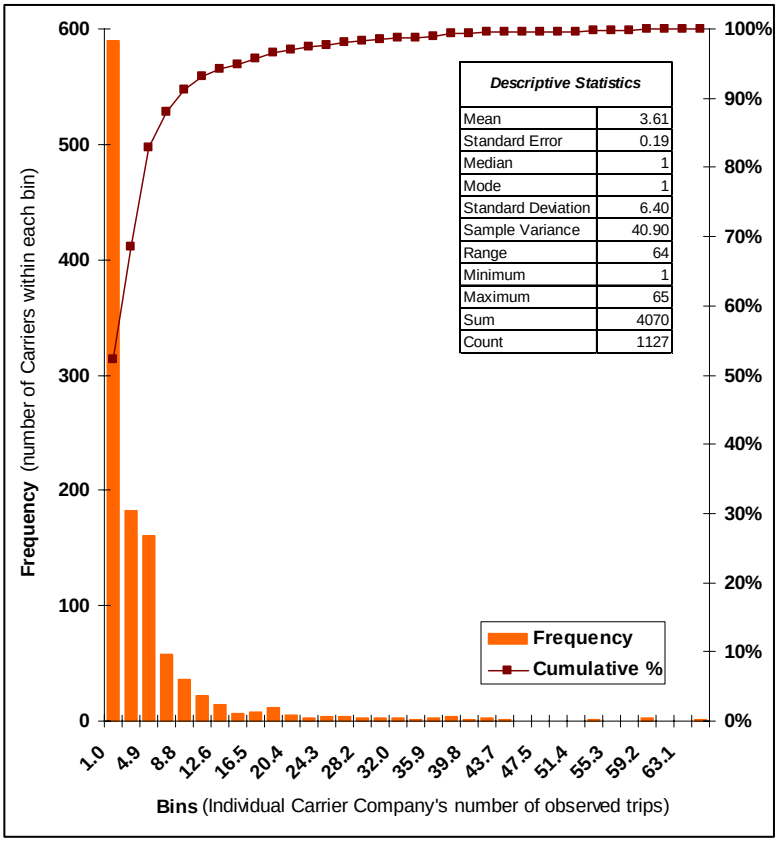
Other observations based on Table 11 are:

- In general, nearly two thirds of Cascade Gateway carriers are based in Canada.
- While showing up in significant proportions at each of the three ports, U.S. carriers based outside of Washington State are almost half of the U.S. carrier share at Pacific Highway – again illustrating the importance of the Cascade Gateway well beyond province-state trade flows.
- Despite its diminished commercial status relative to Pacific Highway and Sumas-Huntingdon, Lynden-Aldergrove shows a higher percentage of "other-US" carriers than Sumas-Huntingdon.

Carrier demographics

Over the course of the 2009 IMTC Commercial Vehicle survey, data were collected on about 4,270 cross-border commercial trips. These trips were made by about 1,127 different carriers (not counting the approximately 190 trips made by private vehicles or trucks with no visible company information).

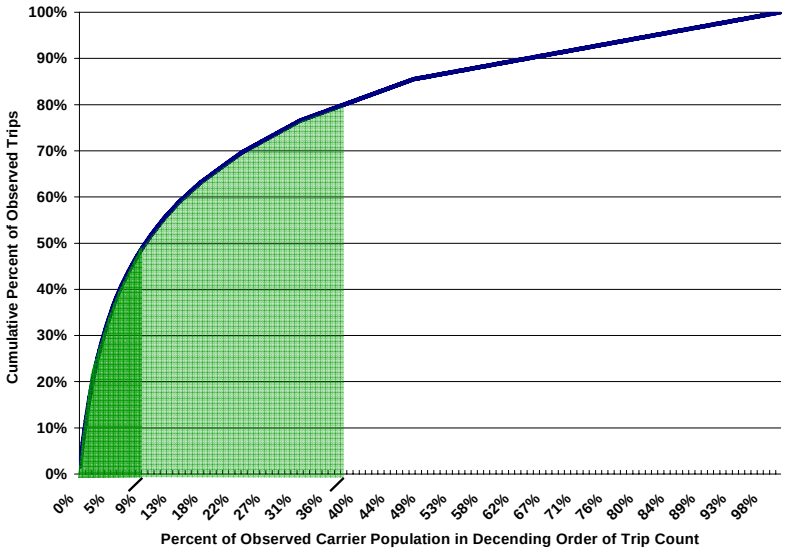
Chart 19: Histogram of Observed Carrier Firms' Border Crossing Frequency During the 2009 Survey



Looking at the relative trip-frequency of the carrier companies in this population (Chart 19 at right), there is a general split between those firms that arrive at Cascade Gateway ports frequently and the much larger portion of observed carrier firms that cross relatively infrequently. Understanding the composition of the cross-border carrier population is critical to informing operational policies that depend on economies of scale. Firms that cross the border frequently will likely have a stronger incentive to invest in voluntary, expedited clearance programs, third-party brokerage services, etc.

Another way to look at the carrier population is from the perspective of the trips. When sorted in descending order of trip frequency, it is observed (as illustrated by Chart 18 at right) that just nine percent of observed carrier firms (about 100) are responsible for half of all trips. So, an observation here is that operational strategies that are targeted at high-frequency carriers can have a dramatic impact on the overall cross-border flow for likely much less cost than strategies that aim to engage all carriers on uniform terms.

Chart 20: Cumulative Percent Apportioned to Carriers in Descending Order of Observed Trip Frequency



Focus on high-frequency carriers

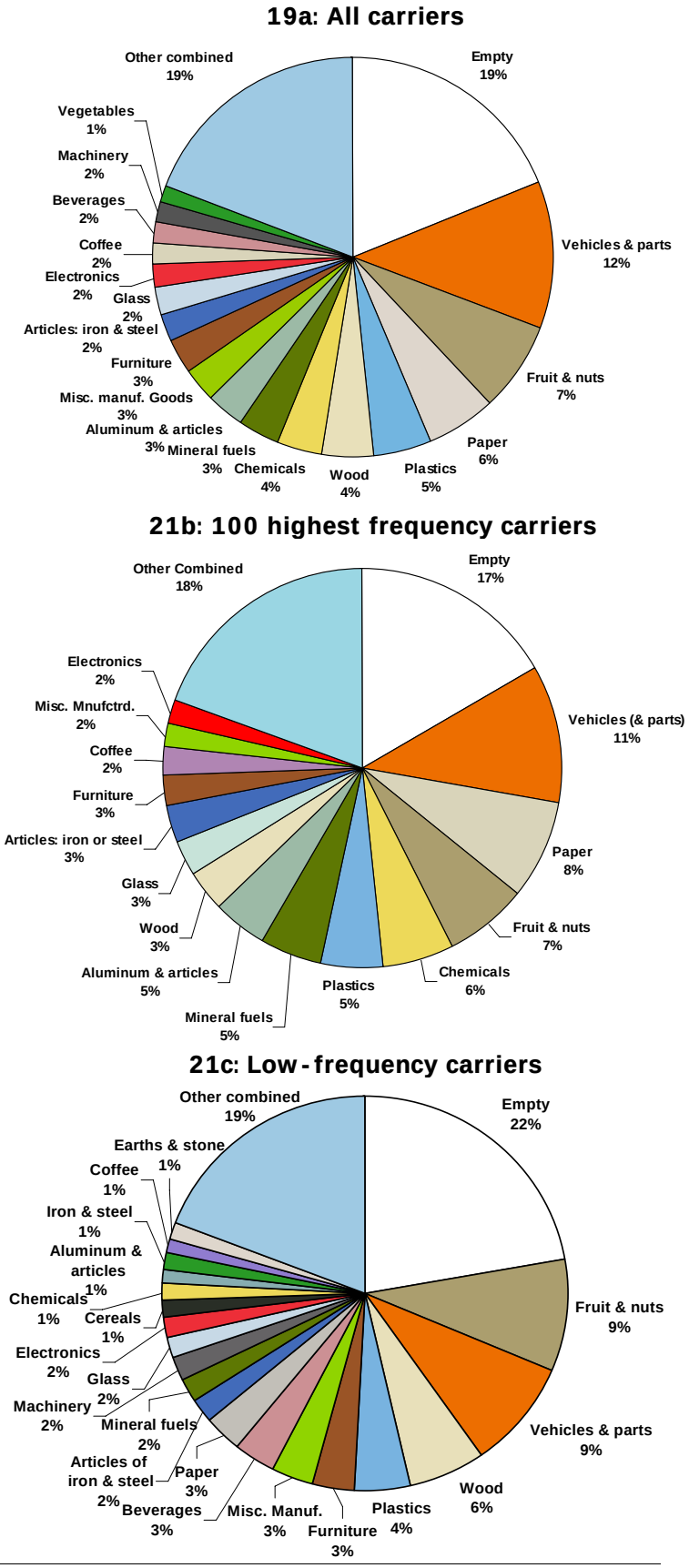
Given the large share of cross-border truck trips made my a relatively small share of the carriers (as explained above), It's worth considering whether or not higher-frequency carriers exhibit distinct characteristics related to commodity.

Chart(s) 21 (a-c) at right summarizes the commodity distribution of trucks crossing into Canada at the Pacific Highway POE during the June 2009 IMTC survey. Chart 21a summarizes all of these carriers, 21b summarizes commodity flow for only the 100 most frequently arriving carriers, and Chart 19c summarizes the same information for the remaining, low-frequency carriers.

Observations are:

- From these three perspectives, there are no dramatic differences.
- The frequent carriers (21b) are associated with fewer commodities (15 including empty) that comprise the top 80 percent of truck-based commodity flow. The Low-frequency carrier firms are associated with 20 commodity groups in the top-80 percent of truck-flow.
- The 100 most frequently arriving carriers (21b) move a higher portion of paper, chemicals, and mineral fuels. More specialized equipment used to move fuel and chemicals is likely concentrated among fewer carrier firms.

Chart 21a: Pacific Highway Northbound, Distribution of Top 80 percent of commodity flow for:



The Free & Secure Trade Program

Following the terrorist attacks of 2001, the United States and Canada agreed to several border-oriented strategies under the Smart Border Declaration (SBD). One of the 31 actions agreed to under the SBD was called the Free and Secure Trade (FAST) Program. FAST has become a high-profile element of border operations at many higher-volume land-border ports of entry including the Pacific Highway.

The basic concept is that carriers and shippers of cross-border freight, who voluntarily comply with inspection agency program criteria and information sharing, are given access to faster and more predictable border clearance. The details of the how the program works at any given port of entry is more complicated.

Both the US CBP and CBSA stations at Pacific Highway have three truck booths, one of which is currently dedicated to the FAST program. Both countries' FAST booths at Pacific Highway are also approached by a dedicated FAST lane developed in cooperation with the respective state and provincial department or ministry of transportation.

For a truck to have access to the FAST lane and booth, and thus avoid otherwise longer wait-times, **1)** the driver must have a FAST card (issued under a binational program called FAST), **2)** the carrier must be accepted into the U.S. or Canadian carrier program: Customs-Traded Partnership Against Terrorism (C-T PAT-carrier) for entry into the U.S. or Partners in Protection (PIP) for entry into Canada, and **3)** the shipper of the goods on the truck must be enrolled in C-T PAT-shipper for entry in to the U.S. or Customs Self Assessment (CSA) for entry into Canada.

Because of the infrastructure and operational capacity allocated to the FAST programs over the last decade, there has been a growing interest (complemented by a growing availability of data and information sharing) in tracking performance and comparing the FAST program to quantifiable alternatives.

Summary statistics on the FAST program compiled from the 2009 IMTC Commercial Vehicle Operations Study are shown below.

Table 10 at right compares the commodity distribution observed southbound (entering the U.S.) in both the standard lanes and FAST lane. Most notable is the very high percentage of empty trucks in the FAST lane—73 percent. The commonly accepted explanation for the preponderance of empties in FAST lane (a regional phenomenon) is that, while drivers and carriers have enrolled in the required "FAST" programs, shippers in the region have been much less motivated. So, the FAST lane (southbound) has become an effective way for carriers to have predictably short wait times when they are empty but an unlikely

Table 10. Southbound FAST lane commodities compared to standard lane commodities

STANDARD			FAST		
Commodity	**#**	**%**	**Commodity**	**#**	**%**
Empty/Mail	448	40.4%	Empty/Mail	236	72.8%
Wood Products	99	8.9%	Wood Products	19	5.9%
Agriculture	54	4.9%	Newsprint/Paper	15	4.6%
Waste/Scrap	48	4.3%	Waste/Scrap	12	3.7%
Newsprint/Paper	48	4.3%	Other Food	6	1.9%
Meat	41	3.7%	Mineral Products	5	1.5%
Base Metal	37	3.3%	Paper Products	4	1.2%
Motor Vehicles	37	3.3%	Motor Vehicles	4	1.2%
Plastic/Rubber	31	2.8%	Other	23	7.1%
Manufactured Goods	29	2.6%	**TOTAL**	**324**	
Other Food	27	2.4%			
Paper Products	18	1.6%			
Metal Products	18	1.6%			
Electronics	17	1.5%			
Bakery	17	1.5%			
Mineral Products	15	1.4%			
Printed Materials	14	1.3%			
Mixed Freight	13	1.2%			
Machinery	12	1.1%			
Chemical Products	11	1.0%			
Furniture	11	1.0%			
Other	64	5.8%			
TOTAL	**1,109**				

alternative avenue for moving freight.

Table 11. Carrier companies using FAST and Standard Lanes [1]

	Carriers	% of All Carriers	Trip Counts	% of Trips
STD Lane	493	72%	1076	77%
FAST Lane	122	18%	326	23%
Both	73	11%	NA	
Total	**688**		**1402**	

Table 11 reviews the distribution of individual carrier firms among the observed trips through the FAST and standard truck lanes. With 11 percent of the observed FAST carriers also making trips though the standard lanes during the survey period, an observation is that relatively few carriers are able to operate exclusively through the FAST lane.

The northbound FAST lane entering the CBSA facility was used by two percent of the trucks during the 2009 survey—a sample too small for meaningful summarization.

More detail on FAST in the Cascade Gateway is covered in the IMTC FAST technical report available at http://resources.wcog.org/border/circ_FASTReport.pdf

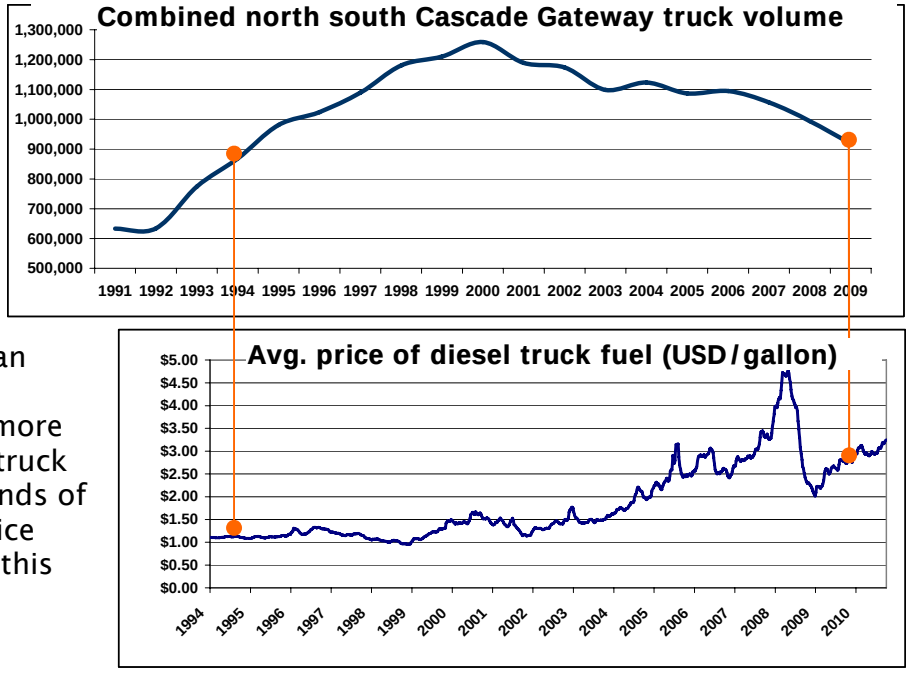
Independent variables that influence freight transportation

The profile of Cascade Gateway freight, the amount of it, the routes, the modes, etc. is influenced by many changing conditions. This section will present several commonly referenced variables alongside previously discussed measures of freight transportation demand.

The price of diesel

It makes sense that increasing prices for truck fuel would cause higher prices for truck transportation, lead to lower demand for trucking, and compel carriers to seek increased efficiency – including an increase in capacity utilization by getting more goods on each single truck trip. The divergent trends of truck trips and fuel price lend initial support to this perspective.

Chart 22. Border truck volume and fuel prices: Weekly U.S. No 2 Diesel Retail Sales by All Sellers (below:US Dollars per Gallon), and combined truck counts

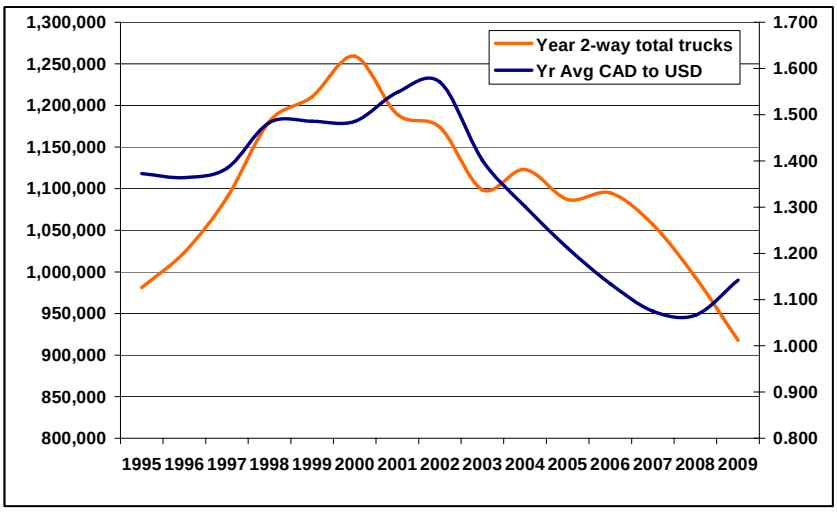


[1] 2009 IMTC Commercial Vehicle Operations Evaluation Survey.

US-Canada exchange rate

Chart 23 at right, while exhibiting some general trend similarities between total regional cross-border truck trips and exchange rate, does not hint at much of a correlation between the two series. Significant annual changes do not match well. Exchange rate is probably a stronger influence on the direction of trade (as shown on page 4) than on the volume of trade-related trips.

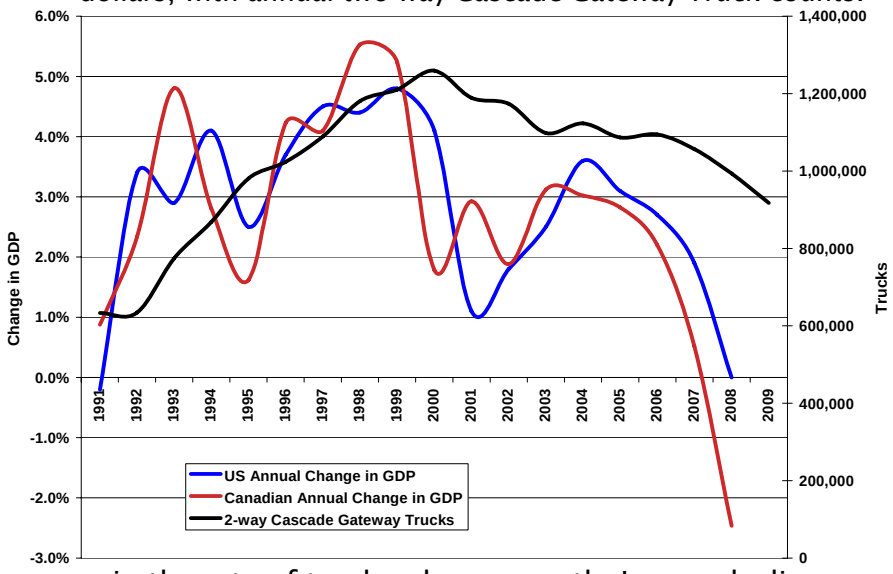
Chart 23 Cascade Gateway annual 2-way truck count with annual average CAD-to-USD exchange rate.



Gross Domestic Product

Even during the early years of the NAFTA (1994, 1995) there were competing schools of thought as to whether surges in cross-border truck volume were more attributable to liberalized trade policy or to the strong-growth economies of Canada and the United States during that time. From the high-level perspective shown in Chart 24, the lower-growth year of 1995 seems only to correspond with a slight decrease in the rate of truck-volume growth. Larger declines in the rate of GDP growth in 2001, 2002, dipping towards shrinkage of GDP in 2008, does correspond with the trend of generally declining regional cross-border truck volume in since 2000.

Chart 24. Annual Change in U.S. & Canadian GDP in 2005 dollars, with annual two-way Cascade Gateway Truck counts.



Cascade Gateway Commercial Trip Typologies – some likely suspects

Based on data collected in the 2009 Cascade Gateway Commercial Vehicle Study, this section develops some typical truck-trip scenarios for regional cross-border goods movement. The method used here starts by filtering the survey data by a characteristic (ex. crossing location), choosing the highest frequency value for that characteristic, application of a second filter (ex. carrier base province/state), and proceeding similarly until a distinct but somewhat common trip type is defined. Using carrier names that were collected in the survey, queries are re-run in the opposite direction (northbound / southbound) to develop a scenario that covers both legs of the truck-type's scenario-based journey.

Type 1: Tractor vans crossing empty at Pacific Highway

Filter	June 2009 Survey Amount	Percent	Monthly volume based on Pac. Hwy. one-way total of
			27,500
Port: PacHwy SB	1,590		
BC based Carrier	634	39.9%	10,965
Origin: W. Lower Mainland	528	33.2%	9,132
Vehicle type: Tractor Van	175	11.0%	3,027
Commodity: Empty	99	6.2%	1,712
Destination: Seattle	13	0.8%	225

Type 2: A tractor flatbed crossing south at Pacific Highway...

Filter	June 2009 Survey Amount	Percent	Monthly volume based on Pac. Hwy. one-way total of
			27,500
Port: PacHwy SB	1,590		
Vehicle type: Tractor flatbed	146	9.2%	2,525
BC-based Carrier	80	5.0%	1,384
Commodity: Lumber	16	1.0%	277
Destination: Oregon	8	0.5%	138

Type 3: A truck heading to Canada from California...

Filter	June 2009 Survey Amount	Percent	Monthly volume based on Pac. Hwy. one-way total of
			27,500
Northbound (all three ports)	2,116		
From California	160	7.6%	
Commodity - agricultural	73	3.4%	
Port: Pacific Highway	67	3.2%	871
BC Carriers	53	2.5%	689
Destination: West Lower Mainland	38	1.8%	494

Type 4: A truck heading to Canada from Blaine, WA – near border logistics

Filter	June 2009 Survey Amount	Percent	Monthly volume based on Pac. Hwy. one-way total of 27,500	
Northbound	2,116			
From Blaine	197			
At Pacific Highway	193	9.1%		2,508
Commodity autos, parts	43	2.0%	559	
Commodity empty	35	1.7%	455	1,365
Commodity food	27	1.3%	351	
To West Lower Mainland (food only)	21	1.0%		273

Type 5: Intermodal container movements

Filter	June 2009 Survey Amount	Percent	Monthly volume based on Pac. Hwy. one-way total of 27,500
Southbound Pacific Highway	1,590		
Tractor Intermodal Container	57	3.6%	986
Going to Seattle	26	1.6%	450
Empty	14	0.9%	242

Type 6: Movement of construction materials.

Filter	June 2009 Survey Amount	Percent	Monthly volume based on Pac. Hwy. one-way total of 27,500
Northbound Pac Hwy	1,475		
Construction related commodity	288	19.5%	5,369
Origined from western WA	91	6.2%	1,697
BC-based carrier	48	3.3%	895
Vehicle type: tractor van	34	2.3%	634

Freight rail in Cascade Gateway

Rail crosses the Cascade Gateway adjacent to both the Douglas-Peace Arch POE and the Huntingdon-Sumas POE. U.S.-based Burlington Northern Santa Fe Railway (BNSF) is the owner of the track at both locations and the primary owner of the Vancouver, BC-Seattle and Huntingdon, BC-to Burlington, WA routes (at Burlington, the track joins the mainline, WA to Seattle).

While BNSF is the cross-border track owner and also a rail-carrier operating its own trains on the route, the highest volume carrier on the route is Canadian National Rail.[2]

Services on the Sumas-Burlington route are exclusively car-load freight. Services on the Vancouver-Seattle route include car-load freight as well as the passenger-rail operations of the Amtrak Cascades. In 2003, the IMTC completed a rail study (done by Wilbur Smith Associates) which evaluated the potential for the Vancouver-Seattle rail route to serve increase shares of future corridor trade-flow. Basic findings included that if freight rail were going to serve intermodal, containerized traffic (and thus offer a service that could absorb some of what would otherwise be carried on highways), 1) an intermodal container service would need to be offered (typically configured as double-stack), 2) at least two tunnel height restrictions would need to be removed (south of Bellingham, WA) to allow for double-stack trains, and 3) a viable customer base would require that the service extend south to Los Angeles, CA (currently complicated by varying track-ownership and additional infrastructure restrictions on double-stack).

Cascade Gateway rail commodity composition

Rail trade data is also compiled by the U.S. Bureau of Transportation Statistics. Table 11 below shows annual values of rail freight as reported by port-of-entry for 2007-2010. Some ports on the list do not appear to be regular or high-value locations for rail and will be excluded from summary analysis in the following subsections. Seattle and Tacoma do seem to be a regular data-collection point for some of the Cascade Gateway flow but the relative amounts are small and so will not be included in follow-on commodity summaries.

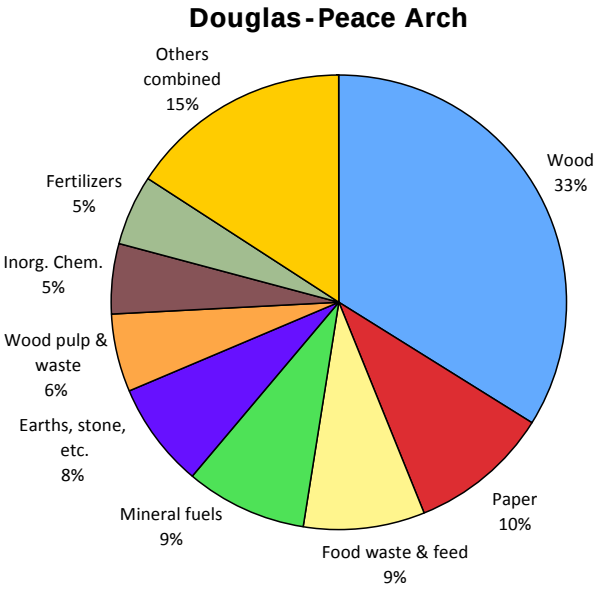
Table 11: Value ($USD 000 - nominal) of international rail freight across the BC-WA border, by port-of-entry and by direction. 2007-2010

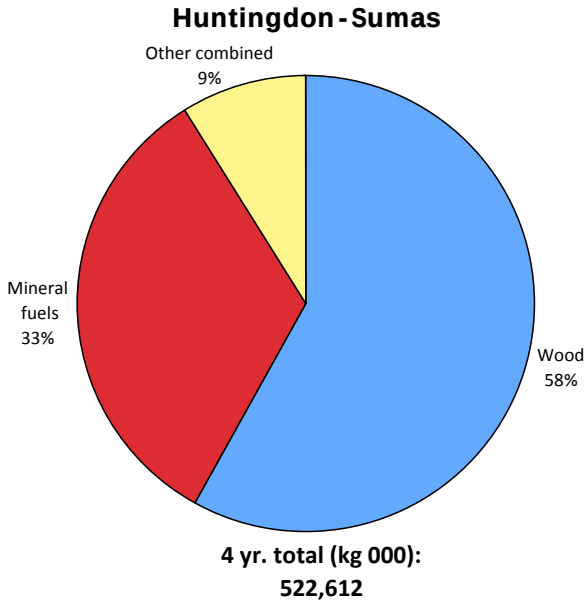
	2007		2008		2009		2010	
Port/District Description	**US to CAN**	**CAN to US**	**US to CAN**	**CAN to US**	**US to CAN**	**CAN to US**	**US to CAN**	**CAN to US**
Seattle - Washington	$393	$4	$613	$71	$240	$0	$534	$0
Tacoma - Washington	$3,870	$0	$4,395	$0	$3,642	$0	$5	$0
Aberdeen - Washington	$0	$0	$0	$0	$0	$0	$51	$0
Blaine - Washington	$78,394	$436,198	$107,524	$491,531	$85,511	$333,541	$178,701	$378,007
Port Angeles - Washington	$0	$0	$54	$0	$0	$0	$47	$0
Port Townsend - Washington	$22	$0	$13	$0	$0	$0	$24	$0
Sumas - Washington	$96	$9,308	$167	$19,599	$26	$9,433	$73	$26,305
Anacortes - Washington	$0	$0	$388	$0	$0	$0	$0	$0
Boundary - Washington	$0	$36,024	$0	$70,937	$0	$40,957	$0	$70,395
Oroville - Washington	$52	$9	$20	$0	$0	$34	$36	$0
Lynden - Washington	$31	$0	$0	$0	$50	$0	$4	$0
Metaline Falls - Washington	$24	$0	$0	$0	$0	$0	$0	$0
Total	**$82,882**	**$481,543**	**$113,174**	**$582,138**	**$89,469**	**$383,965**	**$179,475**	**$474,707**

Similar to information given in Chart 6 (pg 11), the above table shows that the currently larger share of *truck-borne* freight flow from the U.S. to Canada is not mirrored in rail where Canadian exports are the significantly larger share.

[2] IMTC Cascade Gateway Rail Study, Wilbur Smith & Associates. 2003

Chart 25: Rail weight (kg 000) by commodity – combined 4 years, 2007-2010 for Canadian exports through the Cascade Gateway.

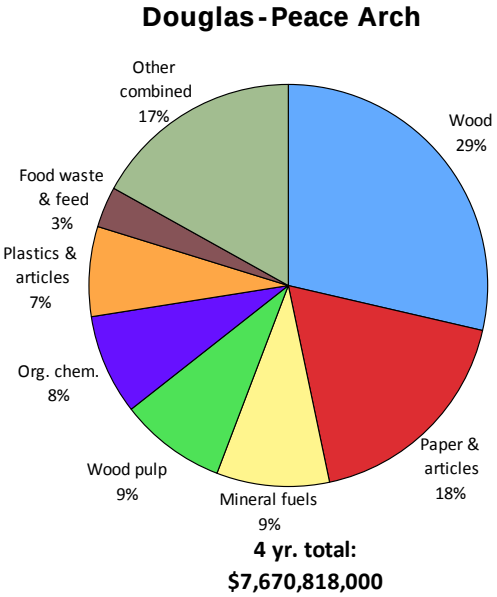




Note: Huntingdon-Sumas total is 2.8 percent of Douglas-Peace Arch total.

Chart 25 (above) illustrates the dominance of wood in the southbound rail flow through the Cascade Gateway. As expected with car-load traffic, the other commodities are also bulk. Huntingdon-Sumas, a much lower total cargo-weight rail crossing, is even more focused on two commodity groups.

Chart 26: Rail weight (kg 000) by commodity – combined 4 years, 2007-2010 for Canadian exports through the Cascade Gateway



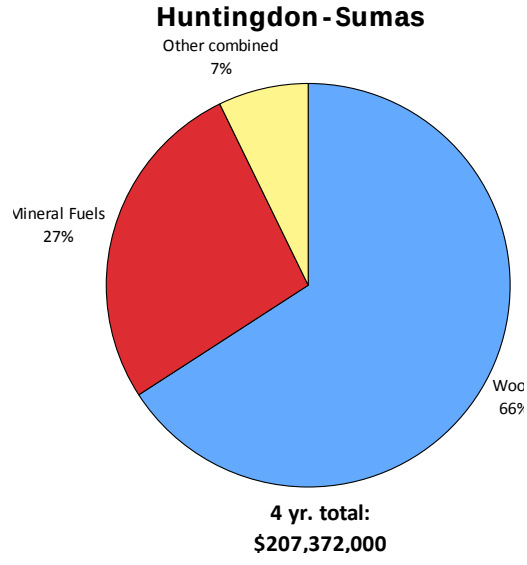
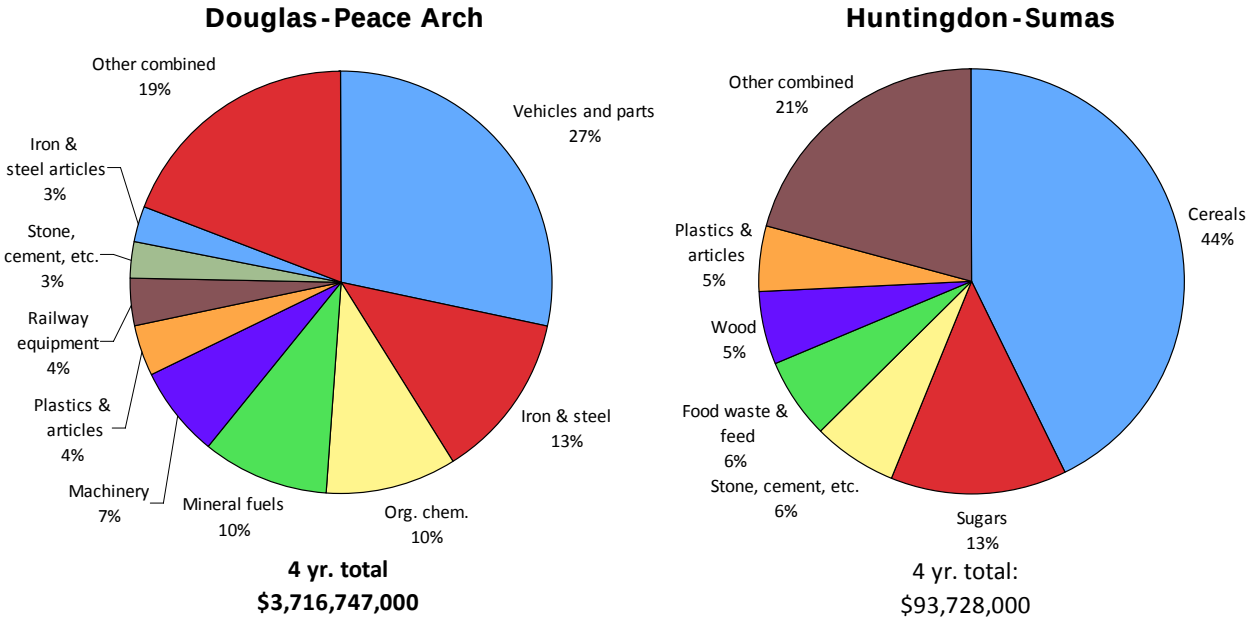


Chart 26 (above) aligns fairly well with the commodity distribution as portrayed in terms of weight. Inorganic chemicals and fertilizers slip into the other-combined category when summarized by value.

Chart 27: Value ($USD nominal) by commodity – combined 4 years, 2007-2010 for Canadian rail borne <u>imports</u> through the Cascade Gateway.



Turning to rail *imports* through the Cascade Gateway, along with the dollar amount of trade-flow being less than half of the southbound amount, the commodity mix is very different. In the rail mode, wood is almost a purely southbound commodity.

The proportion of import value moving through Huntingdon-Sumas is similar to the share of exports there – about 2.5 percent of Cascade Gateway rail-borne Canadian import value.

Cascade Gateway system performance

Based on the information compiled in preceding sections of this profile, this section will propose some performance measures of the productivity of the Cascade Gateway commercial ports of entry. In general terms, performance is taken to mean the system's ability to serve transportation demand on routes that the three commercial ports connect. Specifically, proposed measures will cover border-processing, route-efficiency, conveyance efficiency, modal distribution, and production-consumption geography.

Table 11: 2009 border processing measures with 2006 and 2002 measures

PACIFIC HIGHWAY NORTHBOUND
8AM-5PM weekday

Year	Lane	Queue Time (Avg Mins)	Inspection Time (Avg Secs)	Total Time (Avg Mins)
2002	General	14	49	15
2006	General		64	
2009	FAST	0	77	1
	General	28	82	29

PACIFIC HIGHWAY SOUTHBOUND
8AM - 5PM weekeday

Year	Lane	Queue Time (Avg Mins)	Inspection Time (Avg Secs)	Total Time (Avg Mins)
2002	Empty/Precleared	45	NA	
	General	70	57	50
2006	FAST	20	87	21
	General	78	120	80
2009	FAST	2	87	3
	General	30	113	32

LYNDEN/ALDERGROVE 2009
8AM-5PM weekday

Direction	Queue Time (Avg Mins)	Inspection Time (Avg Secs)	Total Time (Avg Mins)
Northbound			8
Southbound	16	110	18

SUMAS/HUNTINGDON 2009
8AM-5PM weekday

Direction	Queue Time (Avg Mins)	Inspection Time (Avg Secs)	Total Time (Avg Mins)
Northbound	10	121	12
Southbound	15	67	16

Border processing

Performance of our border crossings to conduct the various transactions associated with administering laws and strategies related to trade, immigration, and security can be simply measured in units (vehicles) over time. Summary level measures of the time it takes vehicles to move through border crossings is a function of the processing rate for border inspections and the volume of vehicles in the lineup awaiting inspection. Other contributing factors, though more difficult to measure, include roadway alignments and types of post-primary inspection procedures.

Chart 22 (right) reviews measures of **queue time** (the time between trucks' arrival at the end of the line and its arrival at the primary inspection booth) and **inspection time** (the time between trucks' arrival at and departure from the primary inspection booth).

These tables also separate measures for trucks using the FAST lane.

Collection and summary of these measures helped freight system stakeholders evaluate the impact of investments in automated systems such as electronic truck manifests. E-manifests are widely considered to be an important part of the observed reduction in general inspection time at southbound Pacific Highway between 2006 and 2009 – from a 120 second average to 113 seconds.

This same set of performance data has also been used to build a simulation model of the Pacific Highway port of entry that has informed the decision to evaluate a reallocation of southbound and US CBP infrastructure relative to the FAST program.

Route efficiency

While the establishment of ports of entry is an effective way for federal governments to force the consolidation of international flows through a limited number of inspection points, in many geographies, and certainly in the Cascade Gateway region, the three

border-crossing points that connect international freight flows are likely a significant limitation compared to the built routes that would exist in a purely domestic geography. In addition to that first and somewhat obvious parameter that border-crossings present for transportation efficiency, individual crossings offer different amounts of capacity, hours of operation, and different arrays of service and or limitations. These differences, along with temporal and spatial variation in congestion, can cause carriers to select cross-border truck routes that are not the shortest distance or shortest time.

A performance goal should be to maximize the share of cross-border trucks trips that are using the border crossing that matches the shortest route corresponding to the truck's trip plan.

Conveyance efficiency

For the flow of trucks back and forth across the Cascade Gateway border, conveyance efficiency is primarily about reducing the number of kilometres that trucks drive empty. In a perfect world, every truck would have a load in both directions of its trip. Shared societal goals of Canada and the United States include reduction of transportation system congestion, increasing roadway safety, and reducing greenhouse gas emissions. Reducing overall truck traffic by facilitating the minimization of empty kilometres advances these goals.

Conveyance efficiency is also increased when carriers take steps to maximize the volume of each load. Evidence of this having occurred over the last several years is seen on page 5 where Chart 2 shows declining truck counts while trade value (adjusted for inflation) increases.

Several factors influence carriers' ability to identify or haul loads in both directions of their trip. The total distance of the primary trip affects the distance a carrier will divert to serve a secondary load. Equipment type can limit options (ex. a fuel tanker cannot haul many other types of freight). And, the border itself brings Canadian and U.S. cabotage laws into play. Generally, cabotage laws preclude a carrier from moving goods point-to-point within the borders of a foreign country. So, if a BC-based carrier were driving empty to Seattle to take a load of apples back to Vancouver, it would not be allowed, on the way to Seattle, to haul a load between Blaine, WA and Seattle. And the same would be true of U.S. carriers operating to and within Canada.

Because the share of empty trucks has historically shifted with the exchange rate, the percentage of empty trucks, as a measure of conveyance efficiency at the border, should be blended for both directions. Optimally, the performance measure would be the percentage of empty kilometres driven by trucks that cross the border (irrespective of their status at the border itself) but it's not clear where that data would come from.

Modal efficiency

Cascade Gateway border and transportation system operators, coordinating through the International Mobility and Trade Corridor Project (IMTC), have long held the objective of preserving system capacity by taking steps to ensure all modes serving the trade lane are used in the most efficient and beneficial ways. Current measures can estimate the relative distribution of regional, cross-border trade between highway, rail, marine, pipeline, and air. But setting up benchmarks for optimization will depend to a large degree on both countries formulating national freight policies that articulate goals and strategies.

Production-consumption geography

As our economies have globalized our traditional notions of trade have changed. In simple terms, regions used to exchange goods that they had for goods that they needed. While there are still plenty of examples of "traditional trade" (BC lumber and salmon moving one way and California lettuce and oranges moving the other), much contemporary freight movement is a function of corporations' location of production outside the country of ownership. A generalized result is raw or intermediate goods that are exported to the U.S. for manufacturing in a Canadian factory (or vice versa). A high-profile illustration is provided by the auto manufacturing sector heavily concentrated in the East but split by the U.S.-Canada border. Goods moving back and forth are a function of both "traditional trade" (moving finished goods into the commerce of the other country) but also largely serving intra firm, cross-border production logistics.

While a border region's relative blend of "traditional trade" and intra-firm shipments is not an easy or clear distinction to make, some ongoing characterization of freight flow in these terms could help planners understand how freight transportation demand may respond to broader economic trends such as exchange rate, commodity prices, trade policies, labor migration policies, etc.

Cascade Gateway opportunities

There are many societal goals that Canada and the United States share with regard to our cross-border connection: economic integration, maintaining effective transportation systems for people and goods, managing consumption of fossil fuels and emissions of greenhouse gasses, regulation of commerce, and public safety and security. The Cascade Gateway border crossings are the focus of a long-standing planning coalition, called the International Mobility and Trade Corridor Project (IMTC) which was reviewed briefly in the first section of this profile. Since 1997, agencies have used the IMTC forum to emphasize shared objectives, the desire to manage regional border crossings and transportation facilities as a system, and the importance of operations and information technology in addition to infrastructure. While IMTC initiatives have lead to several notable improvements such as symmetrical development of FAST lanes, regional border traveler information systems, improved data collection and cross-border transportation modeling, collaboration over the last 14 years has also helped clarify where opportunities lie for ongoing optimization.

The rest of this section will review some aspects of the Cascade Gateway system that operators and stakeholders from both sides of the border have expressed interest in evaluating for future improvements.

Commercial vehicle capacity and the FAST program(s)

As discussed above, comparisons with industry's use of the FAST programs in other cross-border regions, feedback from Cascade Gateway region FAST subscribers, and data-based assessments of the regional inspection station processing metrics have all indicated that the FAST program has not provided a system-wide freight capacity advantage. Evaluation of alternatives needs to include the security-advantages that FAST programs provide, but, at existing traffic volumes and within the current FAST program framework, the regional benefits of FAST seem to be limited to smaller-than-optimal share of system users. At the time of this writing, agencies are cooperating to conduct a more formal evaluation of alternatives.

Optimizing route choice

While border crossings by definition often impose a route distortion on trade and travel, Canada and the United States have both, long ago, decided that administering the regulation of these flows at ports of entry provides desired benefits that outweigh the costs. Beyond this, there are many variable characteristics of individual ports and associated roads that stakeholders in the Cascade Gateway can collaboratively evaluate for actions to optimize route choice and balance costs to individual users with public benefits. Some variables that affect cross-border route choice for commercial vehicles and have been discussed by Cascade Gateway stakeholders with regard to proposed changes include the following.

- **Import entry transactions**: When shippers of goods work with customs brokers to prepare import forms, brokers will typically name a specific port-of-entry where the shipment will arrive. Once this "preliminary entry" information is submitted (to US CBP in this example), the goods must arrive at that port. So, if while the carrier is moving the goods there is an incident or bad congestion on the primary route, while alternative cross-border routes may exist, the pre-determined import requirements don't allow dynamic re-routing by the carrier. This would not be the case for an empty truck that is not carrying any goods at all. The opportunity here is possible policy changes that could use recent improvements in automated trade compliance to support routing flexibility for the trade. The emergence of CBSA's e-manifest systems, which will largely mirror CBP e-manifest systems, presents a good opportunity to consider such changes.
- **Congestion:** Congestion relief, whether at border crossings or along the routes to and from borders, is a factor that can distort route choice. Various strategies to reduce congestion should continue, including: evaluation of alternatives to the FAST programs; improvement of advanced wait-time information for trucks (in combination with port-of-arrival flexibility discussed above); and consideration of operations adjustments such as segregation of passenger-vehicle borne cargo, greater shifting of some transactions away from (in advance of) the border, and initiatives to reduce the amount of empty trucks.

Modal distribution of freight demand

Long term, there has been interest among the IMTC Project working group in preserving system capacity by supporting optimal distribution of regional cross-border freight travel demand among adjacently available modes – primarily rail and marine. Feasibility studies of both have been done (available at www.wcog.org). These studies identified levels of demand along with other conditions (infrastructure investment, fuel costs, regulatory changes, etc.) that would likely need to exist to validate public *and* private investment in creating the capability for rail and marine to serve the types of freight that currently move on our highways. The nearer term opportunities are to continue detailed measurement of regional freight flows, continue binational dialogue about Canadian and U.S. interest in true intermodal freight systems—hopefully towards complementary national strategies—and improve the information that is available to develop a business case for possible public investment in strategically chosen components of rail and marine intermodal systems.

Freight data

The availability of border freight data has improved over the last several years. For example, since 2007, the U.S. Bureau of Transportation Statistics has increased the resolution of commodity data from the state-level to the port-of-entry level. But, as illustrated by our binational interest in improving freight forecasting, assessing markets for intermodal service, and informing policy aimed at advancing productive economic integration, continued improvement of data and information sharing is needed. With these goals in mind, some frequently cited data gaps include the following.

- Empty vs. loaded truck counts (especially for trucks entering Canada)
- Canada-bound commodity flow by weight.
- Shipment-level data (because there are often multiple shipments on a single truck). This would enable stronger relation of commodity flow data to affected industries.
- Ongoing origin-destination data

Some opportunities for addressing these and other data gaps have been and continue to be pursued under Canadian and U.S. development of the International Trade Data System – a window on cross-border freight which will rely largely on respective e-manifest and automated import entry systems.

Conclusions

With the overall objective of using this profile to inform strategies and tactics for managing system supply and operations, this section reviews some key observations made in previous sections.

- Lead by the imbalanced flow of wood-products southbound, a current generalization is that more raw material moves south and more finished goods move north.
- Trade in both directions is very diverse both in weight and value.
- Different commodity types have exhibited different trade-volume changes relative to concurrent changes in season, recession, and exchange rate.
- The current pattern of intermodal containers transiting the Cascade Gateway seems to be marine-port arrivals at Seattle or Tacoma, WA that are truck to Lower Mainland BC (often auto parts), and then trucked back to WA empty.
- Understanding the regional composition of the cross-border carrier population is critical to informing operational strategies that depend on economies of scale (ex. FAST).
    - Since a large share of cross-border truck traffic is comprised of a small share of carrier firms, targeted strategies can have a magnified impact on system efficiency.