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Understanding Pacific Highway Commercial Vehicle Operations to Support Emissions Reduction Programs

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ABSTRACT

In an effort to recommend regionally comprehensive border management solutions that will simultaneously reduce cost to carriers, and air emissions, UW researchers will work with the International Mobility and Trade Corridor Project (IMTC), a cross-border planning coalition focused on the border crossings of this region, to design a robust data collection effort focused on commercial vehicles at the three freight crossings in the Cascade Gateway. While the data collection itself will be carried out by Western Washington University students, this study will analyze the data to consider solutions aimed at reducing truck idling and therefore air emissions. This work will continue the compilation of a data time-series, a continuing effort from similar studies of 2002 and 2006. With the data collection effort, an understanding of commodity types and distribution, origin and destination of shipments, and other relevant load characteristics can be obtained. This will be used to evaluate the impact of a set of improvement strategies with respect to emission and idle reduction. The study will evaluate vehicles at the three Cascade Gateway commercial vehicles POEs at Pacific Highway, Lynden, and Sumas for both northbound and southbound. This will allow for consideration of diversion strategies between POEs, with particular consideration of the Free and Secure Trade program and infrastructure, and cross border freight logistics. Solution strategies may include pricing mechanisms for border crossings that are time of day dependent, or changes in policies that create the need for equipment interchanges near the border. This study will provide information to reduce the impact on public health, maintain an efficient and safe border, and protect the air quality of our region.

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Problem Statement

Commercial vehicle delay at the Cascade Gateway border crossings is often long and unpredictable. Vehicle delay is of concern as it increases emissions, inhibits trade, and reduces transportation system productivity. Unpredictability causes transportation companies to build in extra time to their cross-border pick-up and delivery schedules—a costly inefficiency for private asset utilization and a contributor to highway congestion.

To address this, several changes have been made to border operations in recent years, for example the move to electronic manifest filing through the ACE interface, and the introduction of the Free and Secure Trade (FAST) program. ACE is the commercial trade processing system being developed by Customs and Border Protection to facilitate border crossing by requiring advanced and electronic information. FAST and CTPAT are intended to strengthen border security while encouraging trade. FAST is the trusted traveler program that expedites border crossings for approved vehicles, drivers, and cargo. In 2001 and 2006, two similar data collection efforts were undertaken at the border. These showed that although border crossing volumes *decreased* between 2006 and 2001, border crossing times *increased* substantially within in the same period. Since 9/11 there has been increased emphasis on security and as a result processing times over the borders have increased while commercial volume has not. This report presents a longitudinal analysis to compare primary processing times, border crossing volume and crossing times, and their variability by providing another set of 2009 data points.

In previous studies, for example Goodchild et al, 2009, researchers have struggled to identify the correct model of border crossing times such that the model results would validate well with empirical observations. Existing tools typically assume only primary processing time and truck volume are necessary to estimate crossing time, whereas it is clear other factors significantly impact crossing times. The results of analysis of detailed operational data collected by a survey shows that transition time and vehicles moving freight are important factors in driving wait times.

A new element of this data collection effort, which was not part of the 2001 and 2006 studies, was a mail-back survey that gathers information on the logistics of border crossing trips. Specifically, the survey captured origins and destinations, commodities carried (or empty trucks), facility types at transaction points, and the scheduling demands of the trip. This new data allowed for an analysis of border transportation logistics, and the costs and consequences of border delay outside of wait time spent in queue. This report presents an important initial analysis of near border operations and allows us to evaluate connections between border policy and management and near-border freight transportation logistics.

This research, enabled by a data collection effort at the international commercial vehicle crossing at Blaine, WA, addressed three key questions regarding commercial vehicle border operations and near border operations. First, what are the unique features of border operations at Blaine, WA, that are not captured within the standard simulation tools (such as Border Wizard)? Second, what logistical inefficiencies are created by the border that increase empty miles travelled, emissions and total travel time between origin and destination? Third, what has the impact of electronic manifest filing been on primary inspection time?

The data collection effort was funded by a consortium of agencies and organizations concerned about border delay and inefficient border operations. This consortium includes the Border Policy Research Institute at Western Washington University, and the International Mobility and Trade Corridor (IMTC) Project which is convened by the Whatcom Council of Governments. IMTC members include US Customs and Border Protection, the Canadian Border Services Agency, Washington State DOT, British Columbia Ministry of Transport, and other regional and local organizations concerned about cross-border trade and transportation.

Objectives of the Research

1. Describe near border operations and identify possible solutions to reduce empty truck miles. Improve our understanding of near border operations (rather than border operations), and identify obstacles to reducing dwell time and empty truck miles.
2. Improve the understanding of the relationship between primary processing time and border crossing time.
3. Identify the impact of ACE electronic manifest filing on primary processing and primary processing time.

The report is organized as follows: Chapter 1 describes near border operations through analysis of survey data, current knowledge of the impact of policy on near border facilities, and suggests changes to improve near border operations. Chapter 2 describes the features of processing at Blaine discovered during the data analysis that contribute processing time and border crossing time. Chapter 3 evaluates the impact of ACE on interview time, and compares interview times, crossing times, and volume in the 2009, 2006, and 2001 studies.

Chapter 1:

Introduction

Anecdotal evidence suggests that logistical inefficiencies are created by the border, increasing truck miles traveled, stops made, empty truck travel, and air emissions. In 2008, transportation activities accounted for 32% of CO_2 emissions created by fossil fuel combustion, with electrical generation as the only economic sector responsible for more emissions (U.S. Environmental Protection Agency 2010). According to 2002 data compiled by the Federal highway Administration, heavy-duty vehicles were responsible for 33.0% of nitrogen oxide (NOx) emissions and 23.3% of all particulate matter (PM-10) emissions in the U.S. transportation sector (ICF Consulting 2005).

Near border logistics here refers not to delays due to queuing at the border itself, but to routing, scheduling, stopping and transferring that would not exist without the border. Given the share of pollutants emitted by the truck freight sector, a significant level of logistical inefficiency in near border logistics should be considered a significant environmental problem. Current near border operations practices are not well understood but anecdotal evidence suggests that significant logistical inefficiencies are created by the border. While businesses are rational actors which respond to logistical challenges posed by the border in ways which provide the greatest benefit to themselves, the methods and processes of their actions are beyond the scope of this research which is limited to the analysis of how these decisions manifest themselves in observable logistical practices.

This chapter has three primary objectives: first, to describe logistics practices near the U.S.-Canada border at Blaine, Washington, as uncovered through recent surveys of border crossers; second, to examine the impact of specific border policies on logistics practices; and third, to explore policy options to encourage more efficient near border logistical practices. The research reveals truck freight operations which would be unlikely to occur if the border were not present, such as stops and empty trips, and examines options to improve the efficiency of such operations. Examining border policies, the research also reveals that the FAST program is underutilized in the Cascade Gateway region, its use is dominated by empty trucks, and the program provides additional incentive to carry out inefficient logistical activities. This work also discusses the implications of cabotage laws for operational efficiency and examines policy options to mitigate these negative effects. Finally, these inefficient logistical activities are discussed in the context of the policies which encourage such activities, and methods to revise these policies are discussed.

Background

This research was enabled by a data collection effort carried out in June and July 2009 regarding near border operations for commercial vehicles at the Pacific Highway crossing between British Columbia, Canada and Washington, U.S. (see Figure 1). The survey and data analysis enable an evaluation of the logistical inefficiencies created by the border and a contribution to efforts to improve near border logistics by reducing empty truck miles, border delay, and their associated air emissions. To address the first objective of describing near-border logistics practices in the Cascade Gateway region, this chapter answers the following questions: what is inefficient near border activity, to what extent do these inefficiencies exist, and how are they associated with specific border policies? To address the second objective of examining border policies, this research examines the FAST program in a regional context, answering the question of whether there is evidence that the program provides incentives for less efficient operations at Pacific Highway by promoting quick and predictable crossing times for empty trucks. This chapter also examines ways in which cabotage laws impact efficient border operations and, within the context of observed operational patterns in the Cascade Gateway, comments on the possibilities of revising cabotage laws, the FAST program and other border policies to improve operational efficiency.

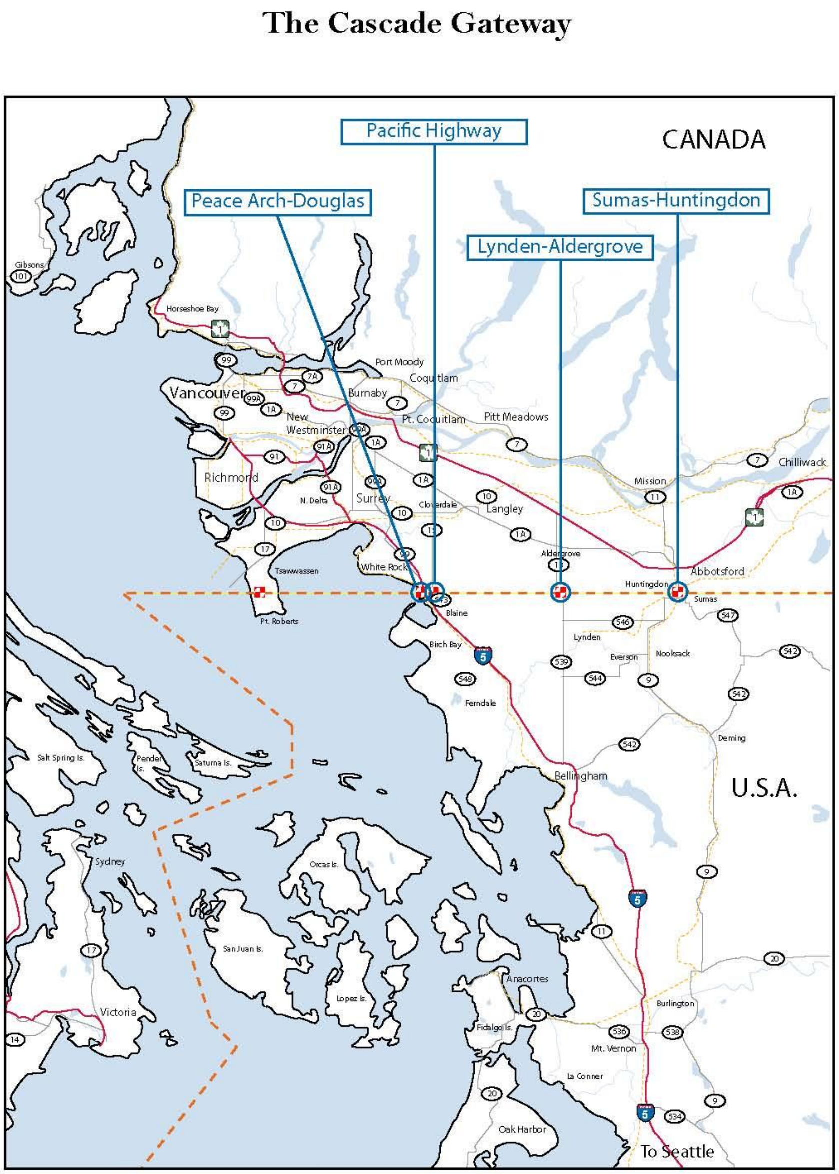

Figure 1: Regional Map Identifying the Study Location at Pacific Highway (courtesy of IMTC)

Motivating this research is the observed high number of empty trucks which cross the border, as one can see in Figure 2 which shows empty trucks queuing to enter the U.S. at Pacific Highway. Further motivating this research is an inordinate amount of freight activity near the border as well as low FAST utilization rates. The data analyzed here represent not only a specific region, but a specific timeframe. Therefore all analysis must be considered within the context of the temporal and geographic attributes of the regional trade in the study period. As Goodchild et al. observed, the commodity mix of cross-border trade in the Cascade Gateway region is quite different than that for trade along the eastern portion of the U.S.-Canada border. Comparing the Cascade Gateway region to the Detroit-Windsor Gateway, the Detroit-Windsor Gateway is dominated by manufactured goods which cross in a time-sensitive business environment, whereas the Cascade Gateway region sees high traffic in wood, paper and plastics, which are relatively less time sensitive (Goodchild, Albrecht, and Leung 2009).

Figure 2: Southbound Empty Trucks at Pacific Highway (courtesy of IMTC)

The data also represent a period of time in which there was a significant trade imbalance at Pacific Highway. In 2009, U.S. imports from Canada were valued at almost $225 billion (U.S. dollars), and U.S. exports to Canada were valued at just over $200 billion. While there is some seasonal variation, values for June 2009 (when most of these data were collected) demonstrate this same relationship, with just over $18 billion in southbound trade and almost $17 billion in northbound trade. For goods moving only by truck, the U.S. exported more to Canada (almost $12 billion in June 2009) than was imported from Canada (just over $8 billion). For trade by truck at Pacific Highway, the imbalance was even more pronounced: during June of 2009, northbound trade was valued at $342 million while southbound trade was valued at $700 million (Bureau of Transportation Statistics, International Transportation Programs n.d.).

Literature and Policy

U.S.-Canada border policies have become more stringent and security-focused since 9/11 (Friedman 2010). This creates delays at the border which can be both uncertain and long in duration. Taylor et al. argue that most delay and uncertainty are "the result of institutional failures, and not a lack of roadbed crossing capacity" (Taylor, Robideaux, and Jackson 2004, 14). As such, this research is concerned with the policies to which perceptions of so-called institutional failures could be traced.

Several studies have commented on the costs of border crossing delays with a focus on the economic costs to manufacturers, shippers and carriers. Analysis by Taylor et al. suggested two broad categories of border crossing costs: delay and uncertainty costs, and general transportation and customs policy costs (Taylor, Robideaux, and Jackson 2004, 11). Taylor et al. argued that a decrease in Canadian land exports to the U.S. was due partly to perceived and actual transit times and uncertainties (Taylor, Robideaux, and Jackson 2004). Globerman and Storer suggest that perception of costs associated with post-9/11 U.S.-Canada border policies could be greater than the actual associated costs (Globerman and Storer 2009). Thus this research recognizes that, whether or not border delays are actual or perceived, they have an impact on operations and are accepted as existing phenomena. These costs could lead to operational decisions such as crossing the border empty or not crossing the border at all. These operational decisions manifest themselves as unnecessary stops and empty miles, decisions which are informed by cabotage laws and the presence of the FAST program. All of these aspects are reviewed below before analyzing the data within the context of these issues.

It should be noted that the role of exchange rates, though crucial to understanding cross-border trade, are outside of the scope of this work. An extensive literature exists on the relationship between exchange rates and trade flows. One currency can depreciate or appreciate against another, thereby losing or gaining relative purchasing power. Basic economic theory dictates that depreciation will thus hurt imports while encouraging exports (Krugman and Obstfeld 2000). If for example the U.S. dollar depreciates against the Canadian dollar, the price of U.S. exports to Canada lowers while the price of Canadian imports to the U.S. rises. Accordingly, U.S. exports to Canada would be expected to rise while Canadian imports to the U.S. would be expected to fall. However, the data in this research were collected during such a small window in time that any fluctuations in exchange rates would have had no visible impact on trade and thus provided no useful data with which to analyze the impact of exchange rates.

Unnecessary Stops and Empty Trips – Metrics for Logistical Efficiency

As this research examines the logistical efficiency of near-border freight operations, the term logistical efficiency as used here must be clarified. The Oxford English Dictionary defines efficiency as the "ratio of useful work performed to the total energy expended or heat taken in". If this were a financially oriented business case analysis, total energy expended would be considered only in terms of financial cost. Since this research is interested in minimizing the environmental impacts of freight operations, total energy expended is considered in terms of environmental costs, such as emissions created by congestion, extra miles traveled and extra stops made. The term 'useful' though is consistent between this environmentally-oriented perspective and a business perspective – a 'useful' trip transports goods, the movements of which are derived from economic demand and proceed within the bounds of an international business and regulatory climate. The term logistical efficiency is traditionally considered in terms of maximizing productivity while minimizing cost and throughput time (Tanskanen and Hameri 1999). Other work has specifically examined the impact of traffic congestion on logistical efficiency, focusing on financial costs to freight operations (McKinnon 1999). This research, however, is concerned with logistical efficiency in terms of maximizing productivity while minimizing environmental costs.

Within this framework of analysis, one environmental logistics cost of the border considered is empty miles driven. Citing concerns about fuel costs associated with empty backhauls, a 1982 study of fresh fruit and vegetable transport in Florida estimated that between 30% and 50% of involved truck trips had an empty backhaul component. Analyzing several carrier, shipper and commodity characteristics, the study found that of all the factors examined, only fronthaul distance driven had a statistically significant relationship with empty backhaul rates (Stegelin and Kilmer 1982). From a traditional perspective of logistical efficiency, this study found that a dramatic increase in backhaul efficiency would provide for only a small decrease in the retail prices of fresh fruits and vehicles. In other words, the impact of fronthaul distance on environmental logistical efficiency was irrelevant since the impact on traditional logistical efficiency was minimal. While this research accepts that the business case may not provide high motivation to increase backhaul efficiency, environmental logistical efficiency is too often ignored by the private sector and the environmental costs of backhaul inefficiency should be considered.

A second environmental logistics cost considered is the number of unnecessary stops made at near-border facilities. Prior to the 1980s, due to higher transportation rates in Canada, small businesses tended to avoid using Canadian carriers by privately transporting goods across the border to interline with U.S. carriers, which both encouraged U.S. firms to locate closer to the border and caused Canadian carriers to drastically reduce their rates (Jones 1996). Jones argues that regulations involving foreign truck entry distort markets by not only affecting the number of trucks entering the country, but the freight infrastructure long the border (Jones 1996). The U.S., deregulating its trucking sector with the

Motor Carrier Act of 1980, greatly reduced entry and exit barriers for trucks. Subsequently, the number of trucking establishments along the border decreased. However, when the Canadian government similarly eased entry and exit barriers in 1987 with the Motor Vehicle Transportation Act, the number of near-border establishments increased. As Jones found, from 1977 to 1991, the commercial zones around U.S.-Canada border crossings saw a 47% increase in the number of establishments categorized by Standard Industrial Classification (SIC) code 421: local trucking and courier service providers. Examining this trend, Jones found that from 1977 to 1986, the rate of these establishments remained fairly constant at an average of 0.15 establishments per million dollars of trade.

After 1987, when Canada began allowing previously limited numbers of U.S. trucks to cross more freely into Canada, the rate of brokers per value of trade rose substantially until 1991, averaging around 0.195 establishments per million dollars of trade. The increased competition and cabotage laws accompanying deregulation made it more difficult for truckers to obtain international backhaul loads. This caused an increase in near-border trucking facilities to help truckers consolidate loads and reduce deadhead miles (Jones 1996).

In a 2005 dissertation based upon 2003 data, Timothy Matisziw noted that the Pacific Highway border crossing saw an approximately 30% empty rate, far above the 11% average of U.S.-Canada border crossings. Matisziw suggested that this could be due to “backhauling or other fleet redeployment practices.” This compares to the 36% average for empty trucks at U.S.-Mexico borders, largely due to drayage and trade imbalances (Matisziw 2005, 23). In this sense, Pacific Highway, which performs much more inefficiently than other U.S.-Canada crossings, approaches inefficiency levels of U.S.-Mexico border crossings where, although drayage is no longer legally necessary, it is still a prominent practice because of factors such as regional characteristics, security regimes and cabotage laws.

From this perspective, goods movement trips at Pacific Highway, which are dense near the border and mostly of short distance (as the analysis below will show), resemble drayage trips. The empty trip rates at Pacific Highway tend to closely resemble empty rates at U.S.-Mexico borders, where drayage is prominent.

FAST Program

The FAST program is a joint U.S.-Canada initiative allowing expedited border crossing for low-risk shipments, for which the driver, carrier and shipper have all been vetted by the respective border security agencies. At certain major border crossings, including Pacific Highway, the FAST program has dedicated lanes which greatly improve border crossing time and predictability over the general purpose lanes. However, the FAST program is underutilized at Pacific Highway. Customs and Border Protection (CBP) data estimate that, in 2008, only 8% of eligible U.S.-bound shipments at Pacific Highway used FAST, compared to 44% at Detroit-Windsor, 31% at Port Huron-Sarnia, and 23% at Buffalo-Fort Erie. In fact, of the sixteen border crossings for which U.S.-bound FAST data were available, only two crossings had a lower percentage of FAST use: Massena, New York and Sweetgrass, Montana, neither of which have dedicated FAST lanes (Skinner 2008). A 2008 Border Policy Research Institute (BPRI) policy brief commented that "The large number of empty trucks crossing the [Pacific Highway] border could be linked either to market-driven commodity flows or to policy-based flaws in the design of freight-inspection processes. This topic merits further attention" (Border Policy Research Institute and Regional Institute 2008).

This suggests that one explanation could be in the nature of FAST requirements. The shipper, carrier and driver must all be FAST approved to use the FAST lane; carriers and drivers are often more strongly associated with each other and can more easily implement FAST requirements, thus creating an incentive for only carrier and driver to enroll in FAST (Border Policy Research Institute 2009). Furthermore, there is a known lack of FAST approved shippers (DAMF Consultants Inc. and L-P Tardif &

Associates Inc. 2005). A 2008 report by the Whatcom Council of Governments found that one of the biggest impediments to FAST use is a low rate of shipper enrollment in the Canadian Customs Self Assessment (CSA) and U.S. Customs-Trade Partnership Against Terrorism (C-TPAT) programs. The report noted that low enrollment is largely due to both a lack of need by shippers to pay for expedited crossing and the burden of enrolling in FAST programs, adding that "if carriers were to charge a higher rate to non-FAST shippers, they would simply lose that business" (Whatcom Council of Governments 2008).

Another explanation for low FAST use is the commodity mix at Pacific Highway. As Goodchild et al. have noted, FAST is underutilized at Pacific Highway when compared to high levels of FAST use on the Eastern side of the country because of the higher levels of goods movement between factories on both sides of the border. Goodchild et al. pointed out that at Pacific Highway, bulk and empty/container/pallet trucks preferred the FAST lane while manufacturing and food commodities were less likely to use the FAST lane (Goodchild, Albrecht, and Leung 2009). The Whatcom Council of Governments in their 2008 report on FAST also found that, although many carriers believed the FAST program was "a good idea in principle", the program was not well suited for regional carriers (Whatcom Council of Governments 2008). The Whatcom Council of Governments also noted that the large amount of LTL shipments at Pacific Highway causes poor FAST performance. LTL is a segment of the freight industry for which FAST is also not well suited. Since, for example, every U.S.-bound shipment must be destined for a C-TPAT importer, it's nearly impossible for LTL shipments to qualify for FAST (Horibe 2008).

Based upon previous assessments that the FAST program is not well suited for trade at Pacific Highway, this research describes near-border operations in the Cascade Gateway region and how the FAST program impacts this logistical environment. The FAST program was designed to assist in the movement of materials quickly and efficiently across borders but, at Pacific Highway, the data indicate that FAST is used to mainly relocate empty trucks across the border, potentially providing incentives to replace truck trips which are loaded in both directions across the border with multiple trips which deadhead empty across the border in one direction.

Improving Efficiency of Pacific Highway Operations

Several studies have suggested strategies to improve logistical efficiency. These strategies range from investing in border personnel and infrastructure to establishing an "external perimeter" by which the U.S. and Canada would form a type of customs union, and are all designed to reduce delay and uncertainty in border crossing time (Taylor, Robideaux, and Jackson 2004). Few studies though have directly addressed the problem of improving environmental logistical efficiency. This research addresses policy areas, such as cabotage law and the FAST program, with the goal of addressing environmental logistical efficiency.

Whereas cabotage law reform is a longstanding issue, the FAST program is relatively new and its analyses have been limited. In addressing policy solutions to improve the efficiency of commercial vehicle operations at Pacific Highway, this research specifically examines the FAST program and cabotage law as avenues in which policy solutions could improve operational efficiencies. However, it is impossible to make direct inferences about the impact of cabotage law on operational efficiency, so data analysis in this research is focused on FAST since there are no tangible metrics (such as FAST use and enrollment) to allow for detailed analysis of cabotage laws. Comments on cabotage are limited to inferences from the data, based upon the background presented in the paper, followed by policy recommendations in the conclusion.

FAST

There have been suggestions to explore options to improve the operations of FAST at Pacific Highway, such as by opening the FAST lane to general traffic more often, implementing a variable congestion-based toll to ease queues, and revising FAST to appeal to more shippers (Phaneuf 2010). Roelofs and Springer examined improving border performance by converting the current southbound FAST lane into a combined FAST/variable toll lane, but concluded that, in their opinion, without adding an extra lane and booth, such a solution would be unlikely to be implemented or go beyond the planning stages (Roelofs and Springer 2007).

Examining how FAST provides incentives for trucks to cross empty can be understood by considering costs associated with variability and duration of border crossing delays. Taylor et al. calculated that, in the years following 9/11, uncertainty in border crossing times was estimated to be responsible for $1.99 billion per year in costs impacting manufacturers ($1.53 billion in productivity losses and $458 million in inventory carrying costs) (Taylor, Robideaux, and Jackson 2004). Taylor et al. estimated the most likely costs of delay and uncertainty to be 1.58% of the total value of cross-border truck-borne trade (Taylor, Robideaux, and Jackson 2004). In a study measuring the costs of border delays, DAMF consultants calculated that border delays cost the Canadian trucking industry between $231 and $433 million in 2004 (DAMF Consultants Inc. and L-P Tardif & Associates Inc. 2005).

Globerman and Storer explain how these factors impact border crossing operations: longer waiting times impact costs such as fuel and hourly pay whereas variability impacts inventory costs and an increased allotment for travel times (Globerman and Storer 2009). Examining variability at Pacific Highway, Goodchild et al. noted that goods movement at Pacific Highway are not as time sensitive as those in more JIT-intensive environments, such as the Detroit-Windsor Gateway. Hence variability of crossing times at Pacific Highway is not a major concern, and building in extra buffer time is a common strategy to manage border service time variability (Goodchild, Globerman, and Albrecht 2008). In their review of strategies to address border crossing time variability, although they discussed the reduction of cross-border activities, they did not investigate the strategy of deadheading empty through the FAST lane.

Cabotage Law

In 2008, the Federal Motor Carrier Safety Administration (FMCSA) commissioned a report comparing U.S. and Canadian motor carrier law regulation and reviewing harmonization and compliance efforts (SAIC 2008). The report found a "satisfactory" level of compatibility between U.S. and Canadian regulatory requirements, but found less than satisfactory harmonization in areas including hours of service, cargo securement, and reciprocity in safety ratings. Though these issues present logistical problems in cross-border trade, more significant are the challenges posed by cabotage laws. Many studies have noted that cabotage regulations constrain efficient logistical operations (Taylor, Robideaux, and Jackson 2004)(Prokop 1998)(Prentice and Kosior n.d.)(Beilock and Prentice 2007). Cabotage laws prohibit a driver from one country from undertaking a domestic pick-up and delivery completely within the confines of a second country. For example, a Canadian driver in the U.S. can only pick up a load destined for Canada, which makes it less likely for a Canadian trucker to obtain a backhaul load destined for Canada (Jones 1996, 49-50). And the effects are costly. Taylor et al. estimated that cabotage regulations cost Canadian carriers an estimated $150 million per year (Taylor, Robideaux, and Jackson 2004, 11).

Looking at specific impacts of cabotage, as Beilock and Prentice explain it, trucking companies often "triangulate" (make a round trip with three or more legs) to avoid low paying backhaul legs (Beilock and Prentice 2007). Cabotage laws, however, prohibit carriers from legs wholly within a foreign country which could make triangulation more effective. In response to this, and partly inspired by observed benefits in removing cabotage restrictions in the European Union, Beilock and Prentice proposed an "Open Prairies" experiment to allow cabotage movements in certain neighboring U.S. states and Canadian provinces in order to facilitate the economic efficiency of cross-border trade of goods and services (Beilock and Prentice 2007). Following this logic, cabotage law relaxation could increase the efficiency of cross-border trade at the Cascade Gateway by presenting more travel options to carriers, reducing the need for empty backhauls – or at least reducing the number of empty miles a truck must make in a foreign country.

Removal or relaxation of cabotage laws would have the potential to improve both metrics of border inefficiencies. Border regulations have been responsible for the build-up of near-border facilities and cabotage laws could be responsible for much of the near-border transloading which occurs. Also, given the difficulties of obtaining cross-border backhauls, relaxation of cabotage could allow for improved efficiency by allowing foreign drivers to make domestic shipments (other than simply repositioning empty), thus reducing empty miles driven. Given the staging which occurs near border, some of these domestic feeder and cross-border trips could be consolidated into single hauls if relaxation of cabotage laws made it easier for foreign drivers to reposition themselves domestically in a more economical way.

Prokop found, through historical research and surveys, that trucking firms find it difficult to comply with cabotage regulations (Prokop 1998, 56). And the effects of cabotage law go beyond the basic definition of prohibiting a domestic movement of goods by a foreign vehicle. In the U.S. and Canada, foreign drivers are not allowed to reposition an empty trailer, unless it was the same trailer with which they arrived in, and will depart from, the foreign country. For example, a Canadian driver making a delivery in the U.S. is not allowed to drop a trailer and pick up and reposition an empty trailer to a backhaul pickup location. They can only do this if they retain their original trailer throughout the entire trip. Otherwise, a U.S. driver must reposition the empty trailer while the Canadian tractor also drives to the backhaul pickup site (Anon. 2006)(Phaneuf 2010).

Drivers are similarly restricted by cabotage law. Drivers must continue in an international direction as must goods (i.e., no purely domestic movements). For example, if a Canadian driver A takes a load into the U.S. but runs out of hours, and Canadian driver B has just made a U.S. delivery and has plenty of hours remaining, business sense would indicate that driver A returns to Canada with driver B's load while driver B delivers driver A's load. This would violate cabotage law though because, since driver A already made a U.S. delivery, picking up a load and making a second U.S. delivery (without going back to Canada) would violate cabotage law, even though the movement of the goods themselves remained legal (Joyce 2004).

Other Approaches

Aside from addressing cabotage laws and the FAST program, policies which incentivize efficient transportation operations, such as a carbon tax or a tax on empty trucks, could be applied to the border to improve the efficiency of border logistics. In the U.K., a private logistics firm has lobbied the government for a tax on empty trucks, estimating that improving the average utilization rate of the 450,000 trucks in the U.K. from 70% to 85% would generate £8 billion ($12.5 billion) in savings for the U.K. trucking industry (Osborne 2009). Although these estimates are not necessarily precise, that they originate from the private sector suggest that market forces incentivize inefficient operations in the form of empty miles, and reducing these empty miles would help carriers save costs. Although the suggestion was not made for international border crossings, the findings imply that a tax on empty trucks could be established which could result in a net financial gain for carriers while removing the number of empty miles driven.

Though a carbon tax is another policy which could potentially incentivize environmentally efficient logistics, existing literature on the impact of a carbon tax on goods movement is not optimistic. A 2002 study modeling the impact of a carbon tax on transport in Germany found that while revenues from the tax would be significant, a reduction in emissions and shift away from road transport would be minimal. The study further concluded that "in goods transportation, policies based on the application of [a carbon tax] cause only undesirable effects" (Piattelli et al. 2002). A joint round table report by the

Organisation for Economic Co-Operation and Development and the International Transport Forum commented that, while a carbon tax would seem the ideal microeconomic solution to improve transport efficiency, the efficacy of a carbon tax could be hindered by several factors, including agreement on target carbon emission reduction goals, the political feasibility of implementing effective regimes, and interaction and conflict with existing transportation regulations and policies (Organisation for Economic Co-operation and Development and International Transport Forum 2008).

Data

To study evidence of operational inefficiency and how such activities are influenced by border policies, this research studies border crossing data collected at the Cascade Gateway (see Figure 1). Data made available through the cooperative efforts of a consortium including members from the University of Washington, the Border Policy Research Institute at Western Washington University, and the International Mobility and Trade Corridor (IMTC) Project, sheds light on these inefficient operations.

From June 15 to July 9, 2009, 4,819 commercial vehicle observations were made by the consortium at the three commercial border crossings of the Cascade Gateway: Pacific Highway, Lynden/Aldergrove and Sumas/Huntington. For a total of eight days (June 15-18 and 22-25, 2009, all Mondays through Thursdays), data were collected solely at Pacific Highway. For each of the 3,071 commercial vehicles observed crossing this border, instructions to complete an internet-based survey were distributed to all trucks with instructions to have their dispatcher complete an online survey providing additional trip information. These survey results provided information not available in the observational data such as facility type(s) visited and complete round-trip (linked fronthaul and backhaul) information. Complete round-trip information allowed for an understanding of backhaul practices whereas the observational data only captured traffic in a single direction on a given day. Figure 3 shows students from Western Washington University collecting observational data while Figure 4 shows a student distributing a form requesting survey data. (For more details on these data collection efforts, see the IMTC report in Appendix B).

Unless stated otherwise, all analysis referring to "observational data" is based upon observed Pacific Highway border data, since this is the busiest border crossing, the only of the three borders with a FAST lane, and the only border at which surveys were distributed.

Figure 3: Collecting Observational Data (courtesy of IMTC)

Figure 4: Requesting Survey Data (courtesy of IMTC)

Of the 3,071 trucks to which surveys were distributed, 215 unique survey responses were received, of which 211 were analytically useful (189 of which contained complete backhaul information). This data set is referred to as the "survey data" throughout the analysis. The surveys themselves capture information for a single cross-border round-trip. If a truck made more than one round-trip that day, then data collected is only for the first round trip. However, there were very few incidents of multiple round-trips within a single day, so analysis was limited to the first of multiple round trips when applicable.

Preliminary Data Analysis

Observational Data

Though the observational data do not reveal which trips were part of a same-day round trip and which were part of longer trips, it is possible to identify trips which would be unlikely to have been part of a same-day round trip. Given the hours-of-service regulations of the Federal Motor Carrier Safety Administration in the U.S. (maximum 14 hours on duty, 11 hours driving time)(Federal Motor Carrier Safety Administration n.d.) and the Canadian Council of Motor Transport Administrators (maximum 14 hours on duty, 13 hours driving time)(Canadian Council of Motor Transport Administrators 2007) it is safe to assume that the most a cross-border driver will drive in a single day is 11 hours. Assuming a generous average travel speed of 65 mph yields a maximum likely same-day distance of 715 miles. Thus, for the observed data, distances are rounded down to assume that any leg which is over 350 miles is not likely part of a same-day round trip and the analysis focuses on trips which are within this limit. Of the 3,914 observed trips for which distances were calculated, regional trips accounted for the majority of Cascade Gateway commercial traffic, with 74.9% of trucks traveling less than 350 miles from origin to destination. This trend has been observed in previous studies (Goodchild, Albrecht, and Leung 2009). Furthermore, of the 25.1% of trucks which traveled more than 350 miles, 23.6% were empty; of the 75% of trips which were regional, 37.9% were empty, indicating that regional trips may be of more interest in an efficiency analysis.

Survey Data

Before analyzing the survey data, the results were weighted to reflect different response rates amongst carriers. Figure 5 shows the proportional and actual response rates by individual carriers in both the observational and survey data. Though the observational data is comprised of approximately 35% U.S. carriers, U.S. carriers responded to more than half of the surveys distributed.

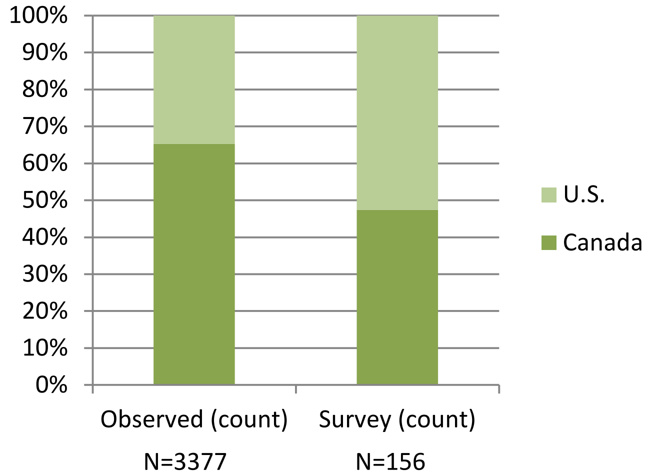

Figure 5: Carrier Counts

Studying this difference revealed some confusion among survey respondents (the dispatchers to whom the survey request was given by the driver) as to how many surveys to complete. As several dispatchers handled multiple trucks receiving surveys, some dispatchers were unclear as to how many surveys to complete. As one respondent commented: "I have received 8 of your survey request are you looking for each on to be fill out?[sic]". Figure 6 shows the number of observations of any carrier observed at least 25 times in the population, and Figure 7 shows the number of responses by any single carrier in the sample which responded more than once (all carriers are identified here by home country and randomized carrier ID in order to protect identity). To compensate for different response rates by individual carriers, all values in the sample data set were weighted so that all carriers rather than trips were represented equally.[1]

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[1] Survey results for carriers who could not be identified were assigned a carrier weighting value of one

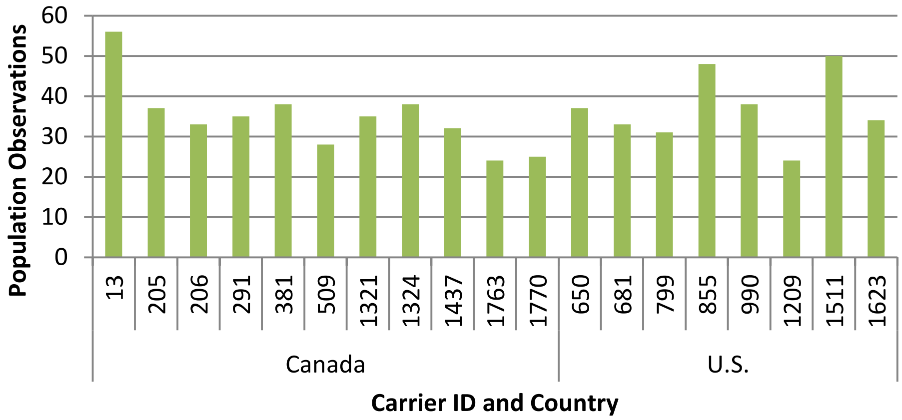

Figure 6: Carriers Observed At Least 24 Times in the Observational Data During the Survey Period

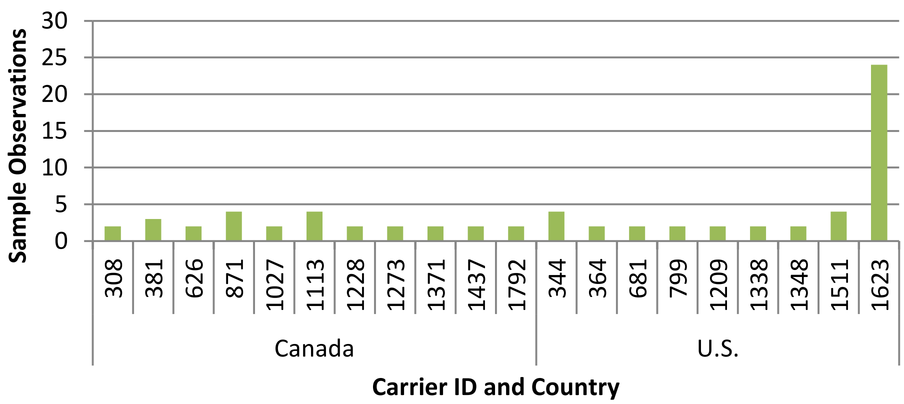

Figure 7: Carriers Which Responded More Than Once to the Survey

As Figure 8 shows, applying a weighting method in this way to both the survey and observational data sets brings the U.S. to Canadian carrier ratios closer together. The first two columns represent the carrier country ratios based upon the number of trucks observed while the second two columns represent the carrier country ratios where the data sets are weighted to represent each carrier equally. So, instead of weighing each respondent equally, we have weighted each respondent so that the results reflect the carrier-trip population in the operational survey. Such a weighting method leaves the observational data virtually unchanged while bringing the survey data in better alignment with the observational data.

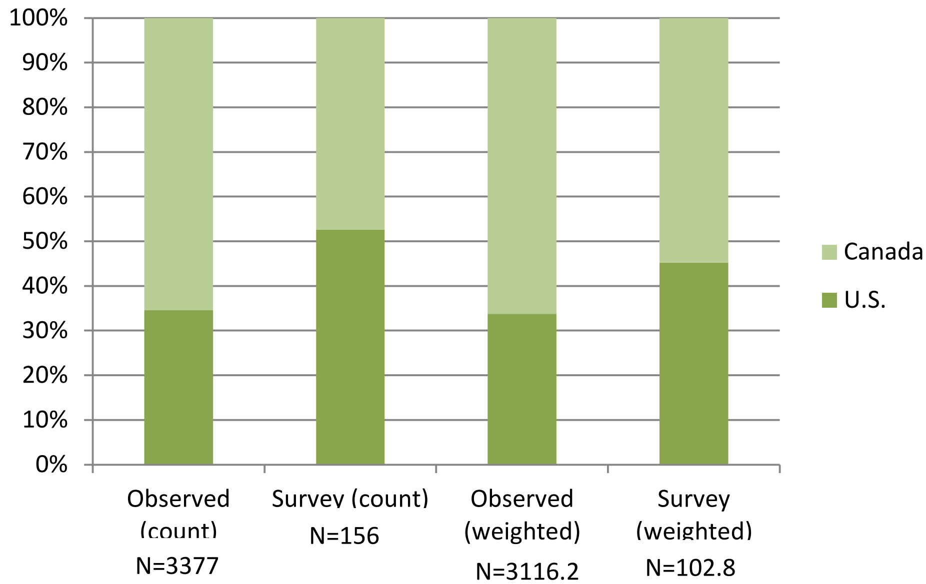

Figure 8: Actual and Weighted Carrier Counts

To determine the statistical significance of the survey data, and by treating the survey data as a sample of the observational data, Table 1 calculates confidence intervals for the observational carrier ratios based upon the carrier ratios in the survey data (all data here is filtered to remove entries where the carrier country was not known). Examining unweighted data first, applying a 99% confidence level to the percentage of U.S. trucks in the survey (52.56%) tells us that we are 99% confident that the ratio of U.S. carriers in the population data should be between 42.26% and 62.86%. Since the observed data contained 34.62% U.S. carriers, it is safe to conclude that the unweighted survey data is not a statistically significant sample. However, controlling for carrier frequency gives a U.S. carrier ratio of 45.2%. We can then be 99% confident that the U.S. ratio of the population data is between 32.51 and 57.89%. Since the weighted U.S. carrier ratio is 33.75%, the survey data is a statistically significant sample (at a 99% confidence level) of the observational data.

Table 1: Data Set Significance

	Trip Count		Carrier Weighted	
	Observed	*Survey*	*Observed*	*Survey*
Canada (n)	2228	74	2064.51431	56.3333333
U.S. (n)	1180	82	1051.61284	46.46
Total (n)	3408	156	3116.12715	102.793333
% U.S.	34.62%	52.56%	33.75%	45.20%
	Confidence Range for Observed Data, U.S. Carriers			
% U.S. carriers	*Min*	*max*	*Min*	*max*
90% CI	45.98%	59.14%	37.09%	53.31%
95% CI	44.72%	60.40%	35.54%	54.85%
99% CI	42.26%	62.86%	32.51%	57.89%

Though the observational data presented a single commodity code per trip, the survey data captured, what was for many round trips, multiple commodities. To make the two data sets comparable, the survey data was filtered for a primary commodity to be considered as the commodity carried by the truck for analysis purposes. For trucks which carried goods in more than one direction, the commodity carried in the fronthaul was set as the primary commodity. For the few trips which carried multiple commodities, if different commodity codes were carried, the first commodity listed or picked up was considered to be the primary commodity. In the following analysis, all mention of commodity in the survey data refers to this primary commodity.

Analysis I – Evidence of Inefficiency

Inefficient logistical activities can manifest themselves in several ways, and this paper considers two primary metrics to evaluate inefficient trucking operations influenced by the border. The first metric concerns the frequency and extent of empty trips made both across and tangential to border crossings. The second metric concerns what can be considered border-induced stops, which refers to those logistical activities which occur near the border and would likely not happen if it were not for the presence of the border.

Border Induced Stops

Anecdotal evidence and previous research by Jones suggest goods may be staged near the border so that equipment or drivers can be exchanged prior to crossing. The concentration of near-border activity can be measured by examining the concentration of origins and destinations by distance from the border. To determine what extent this concentration could be plausibly attributed to the border, population is considered as a rough surrogate for economic demand and the ratio of stops to population is examined to gauge a level at which stops could be attributed to the border. Facility type as indicated on the survey is also examined to determine the nature of the trips made.

Using ArcGIS and population data obtained from ESRI, a provider of Geographic Information System software, Figure 9 shows a high concentration of cross-border truck destinations (obtained from the observational data) per capita near the border. Notice that locations near the border generate several orders of magnitude more destinations per capita than most locations. The city with the highest destionation per capita ratio, Blaine, Washington, is the U.S. city which abuts the border at Pacific Highway. The city with the second highest delivery per capita ratio, Ferndale, Washington, is located just to the south of Blaine along the Interstate 5 corridor. This concentration of freight activity on the U.S. side of the border validates assumptions of a build up of U.S. near-border freight facilities.

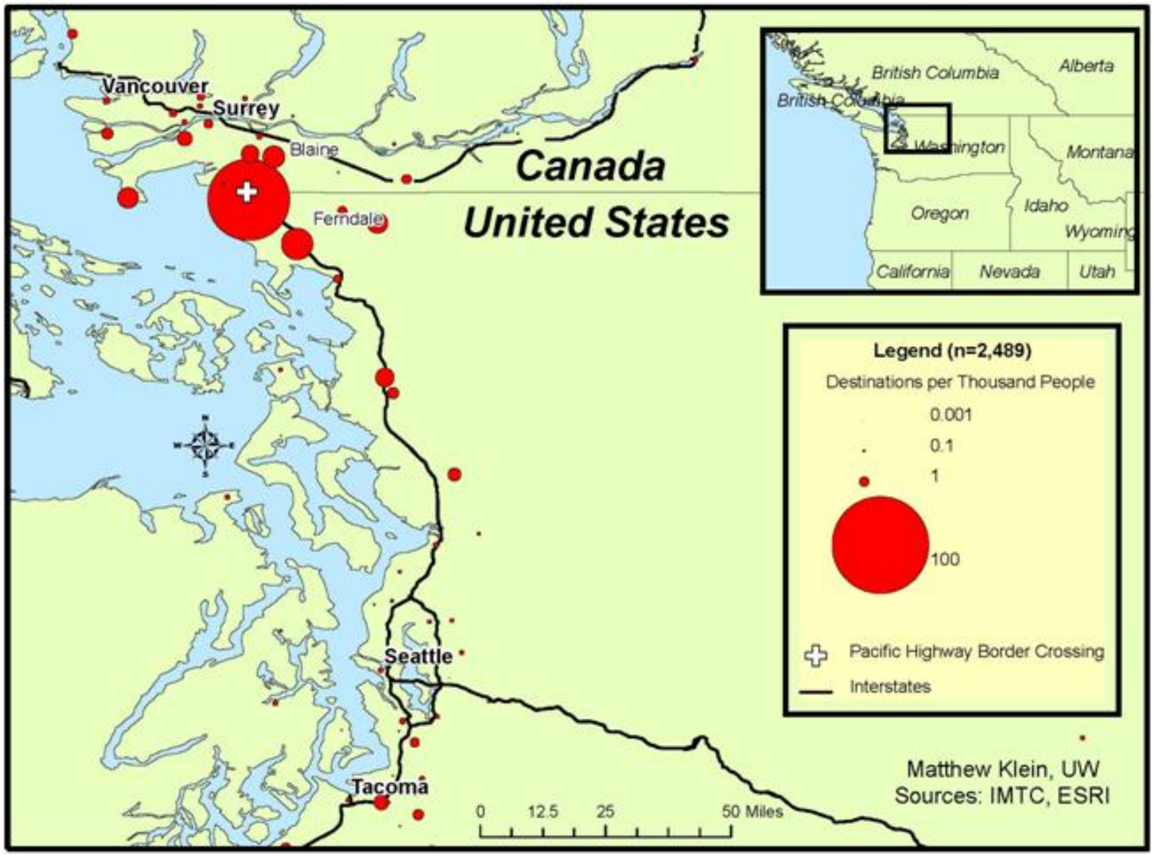

Figure 9: Destinations per Capita

Examining facility type sheds further light upon the phenomenon of near border freight operations. Each trip must originate at the cargo's source and ultimately arrive at the receiver's business location. While some intermediate stops are made at warehousing and distribution center locations for cost and inventory efficiencies, these trips increase vehicle miles traveled and associated social costs (emissions, fuel consumption, noise pollution, safety concerns). Assuming trips made to receivers' business locations, intermodal facilities, farms or raw materials locations, or distribution centers are classified as necessary stops, and would occur whether the border existed or not, it is possible to bound the amount of unnecessary trips involving trucking company facilities.

Trips to a trucking company facility may demonstrate unnecessary trips generated by the border, but may also be made for sorting or repackage activities which reduce logistics costs. However, in a minimum stopping environment, trucks would only travel from shipper to receiver locations. For all northbound trips with goods, Figure 10 identifies at what type of facility each northbound trip originated and how far from the border in the U.S. that facility was located. Distances traveled were calculated by geocoding city and border locations (due to privacy concerns, city-level was the highest level of resolution for which geographic information was available). Straight-line distances between city center and the border were calculated to estimate distance traveled. This shows that, for northbound deliveries originating within 25 miles of the border, the most common originating facility type is a trucking facility, with distribution centers as the second most common facility type. The data also indicate relatively few business locations located near the border.

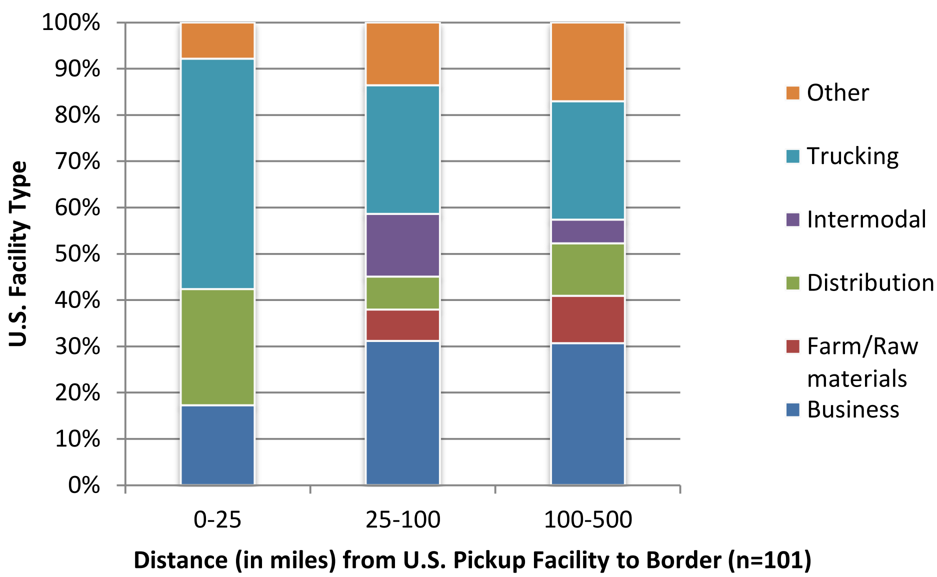

Figure 10: U.S. Facility Type by Distance

Border Induced Empty Trips

The second metric is empty truck crossings. In the study period, 18% of northbound trips and 46% of southbound trips were empty. Though the regional trade imbalance at the time of the study means that southbound trucks were necessarily empty more often than northbound trucks, this is not the only reason for empty trips. Other factors including specific commodity flow directions and equipment specialization also impact empty trip patterns. An analysis of individual commodity flows reveals which commodity types see more or less empty trip rates as necessitated by the amount of commodity trade (this assumes trucks serve only one commodity in both directions).

A less visible cause of empty truck trips though is the cost-benefit tradeoff which determines whether or not a driver should return more quickly (and with less administrative cost) without cargo or search for cargo to make the return trip more profitable. The following sections will demonstrate that increasing driving distance correlates with lower empty backhaul rates, and that FAST lane traffic displays an exaggerated relationship between driving distance and empty backhaul rates.

Analysis II – Factors of Inefficiency

Factors which influence near-border operational inefficiency can be considered to be in one of two categories. The first is market-related factors, such as commodity flow and trucking operations in a deregulated market. The second is policy-related factors (those not determined directly by market forces). In this research, cabotage laws and the FAST program are investigated as policy-related factors influencing inefficient operations.

Market-Related Factors

Distance

Generally, the further a truck travels from the border, the more likely it is to obtain a backhaul load to cover the costs of crossing empty. Figure 11 shows this relationship by examining the backhaul rates from the survey data, excluding destinations with less than five trips. Locations such as Seattle and Tacoma, which are relatively distant from the border, see a higher rate of trucks which deliver to these locations and secure backhaul loads for the cross-border return trip.

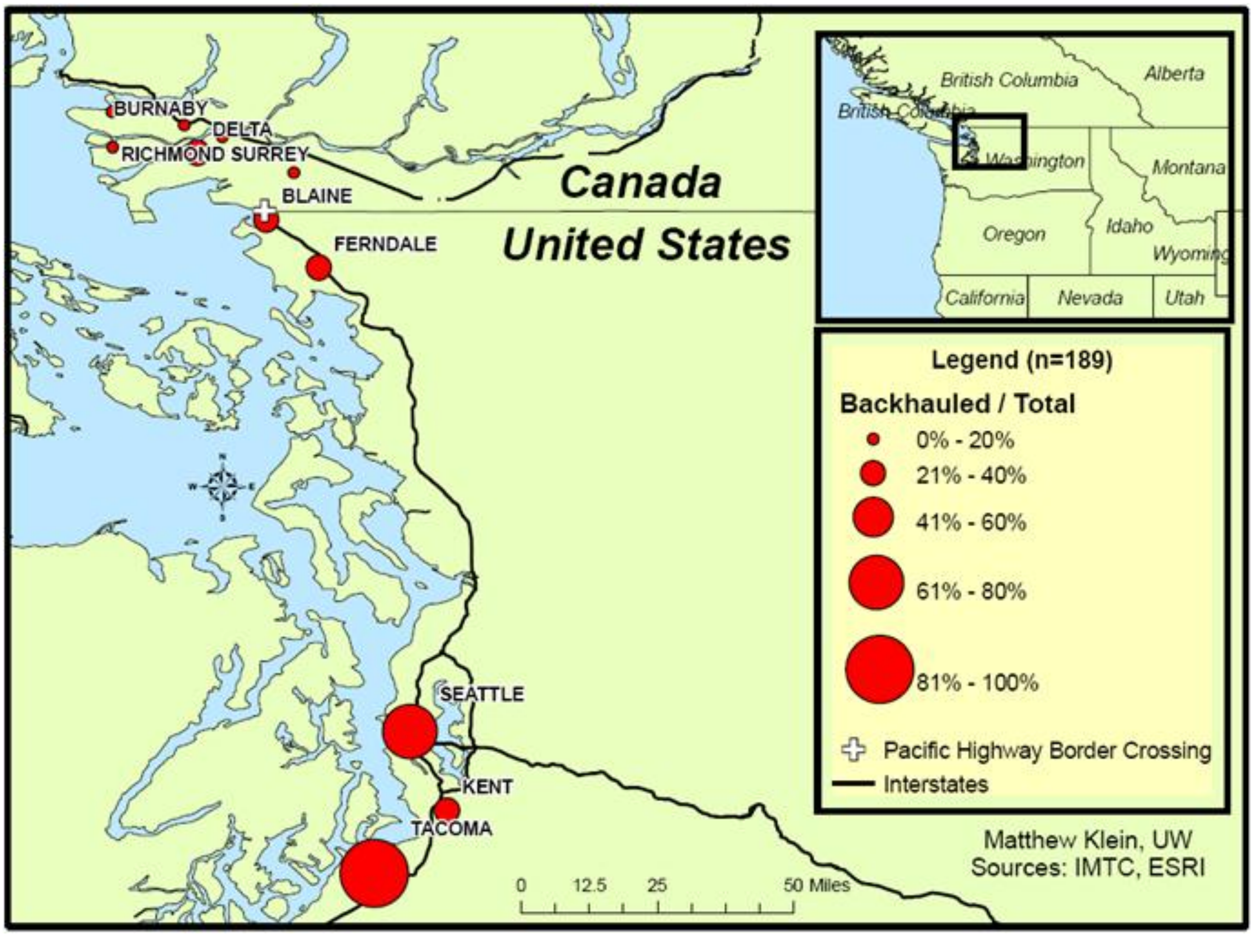

Figure 11: Backhaul Ratios by Delivery Location

Examining the observational data for all three border crossings reveals more nuanced trends in the relationship between distance and load rates. In this section, origin-destination distances are compared with trip segment distances to and from the border alone. Distances which involve the border are calculated in this research by examining distances traveled within the U.S. alone. Since most regional Canadian activity is concentrated relatively close to the border, the distances traveled within Canada alone reveal little about the nature of the relationship between distance and load status. Distances involving the border are thus only calculated on the U.S. side since the major population and economic centers are located at some distance from the border, allowing for a more robust analysis of distance.

Figure 12 compares northbound origin-destination distances with northbound origin-border distances, revealing statistically significant relationships between load ratio and both distance measurements. Here northbound border-destination distances are excluded because of the short distances involved in driving between the border and Canadian destinations. The figure demonstrates that the further a truck travels, for both total origin-destination and border-to-destination distances, the more likely the truck is to obtain a load for its backhaul trip. This result corresponds with the conclusion made during the previously reviewed article on fresh fruit and vehicle transport in Florida that fronthaul distance driven has a statistically significant correlation with empty backhaul rates (Stegelin and Kilmer 1982).

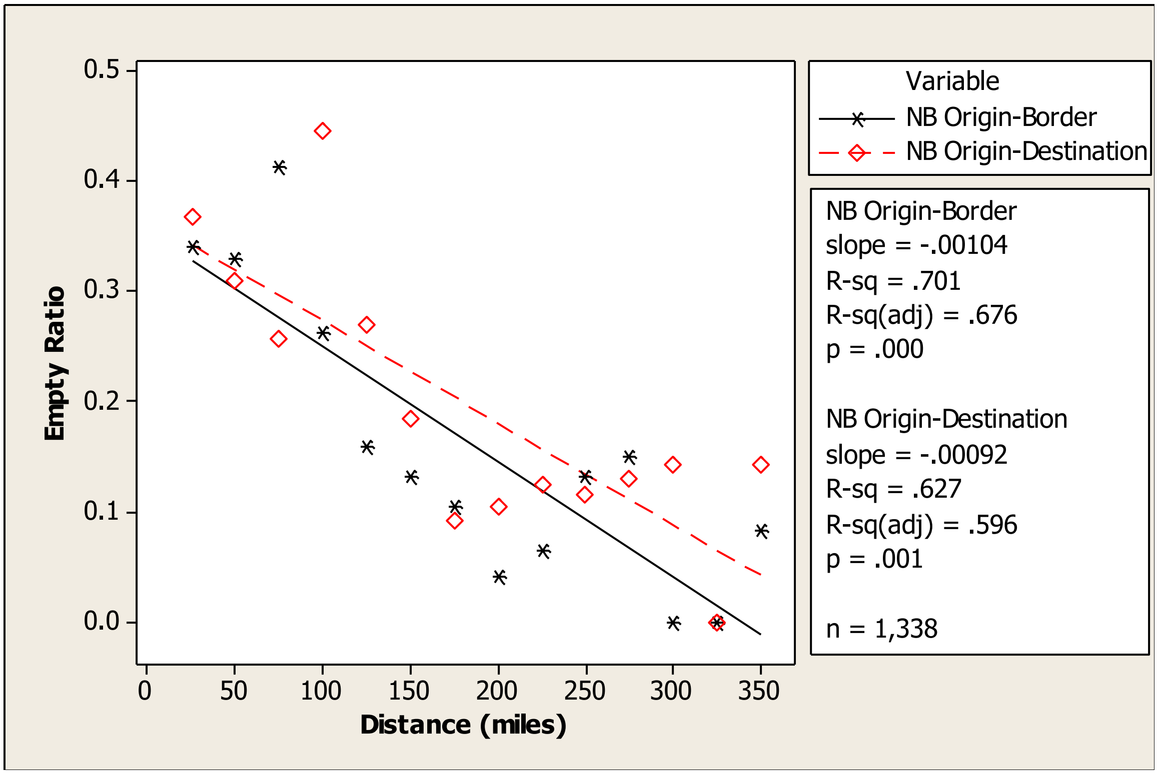

Figure 12: Northbound Distances and Load Ratio

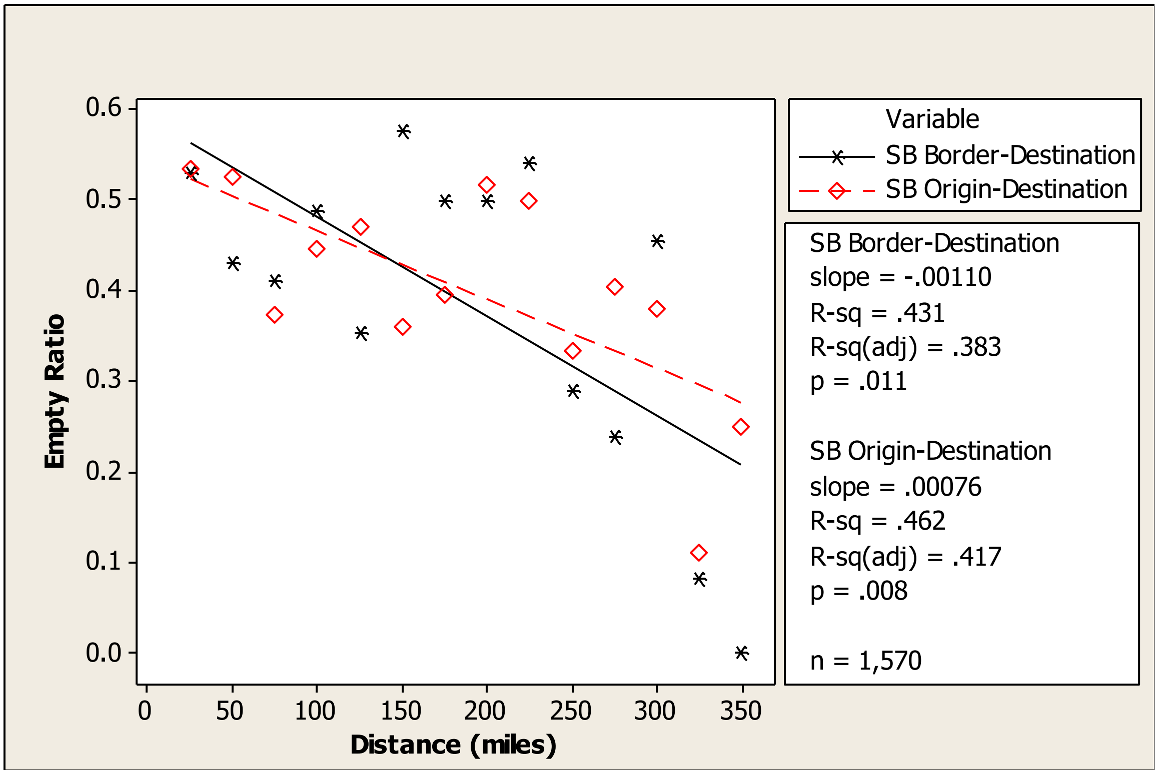

Figure 13: Southbound Distances and Load Ratios

Commodity

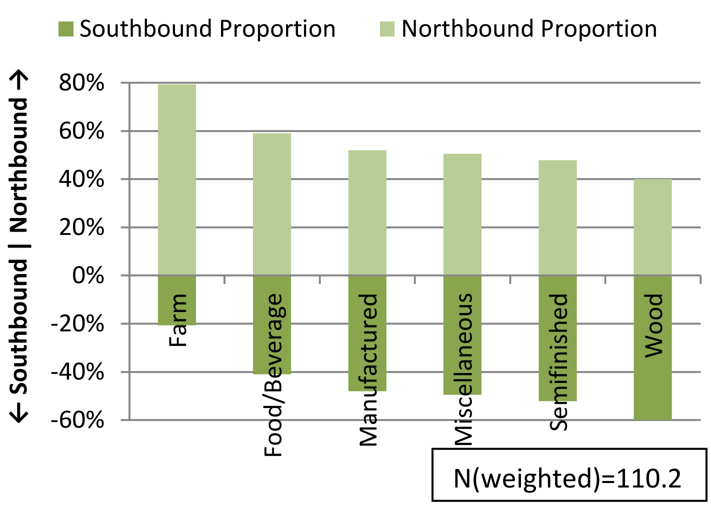

Figure 14: Commodities of Observed Trips by Direction of Movement

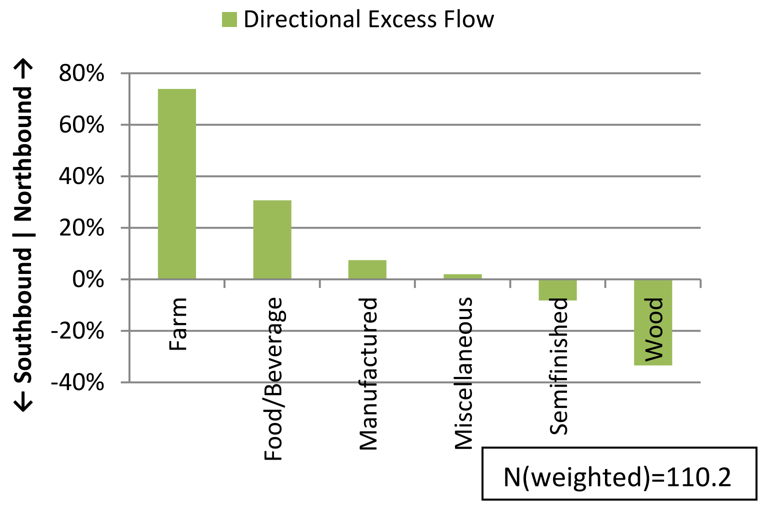

Figure 15: Excess Flow as Proportion of Total Trips per Commodity by Direction of Movement

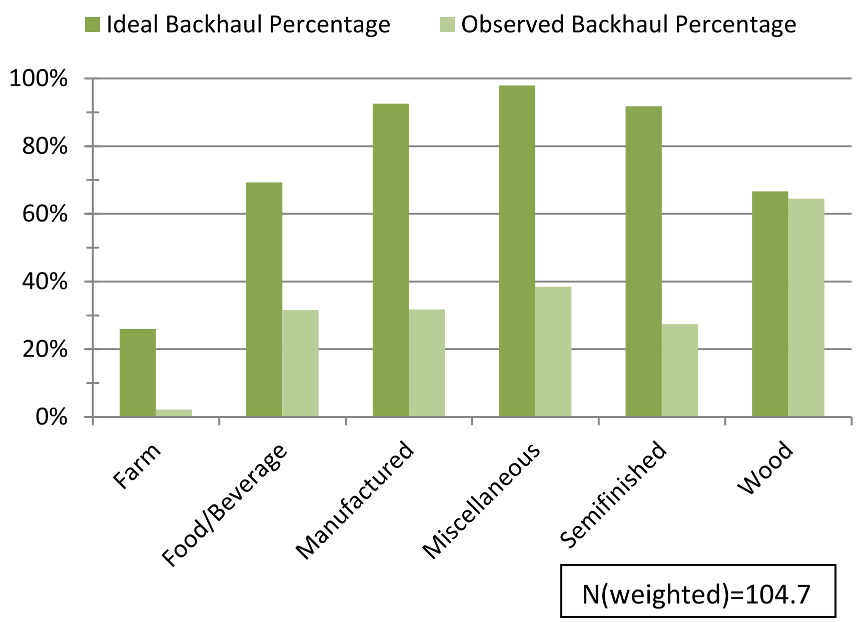

Figure 16: Ideal and Observed Backhaul Rates by Commodity

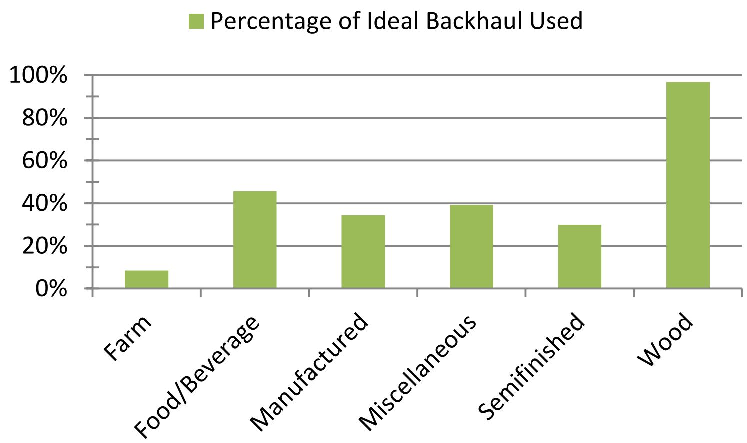

Figure 17: Percentage of Ideal Backhaul Used

Carrier Country

One way to understand empty trip miles is to examine the relationship between the carrier country and type of trip taken. Figure 18 shows that, for the observed data, 69% of Canadian carriers crossed with a load whereas only 54% of U.S. carriers crossed with a load. Figure 19 further reveals that in the observational data, whereas about 65% of U.S. exports to Canada are carried by U.S. carriers, about 75% of Canadian exports to the U.S. are carried by Canadian carriers. From the survey data, Figure 20 similarly shows that round trips by Canadian carriers are more likely than their U.S. counterparts to include a backhaul component. These data all indicate that Canadian carriers operate more efficiently than their U.S. counterparts regarding securing backhaul loads. This reinforces the point that short border to destination distances in the Lower Mainland make it not worth it for U.S. carriers to find backhaul.

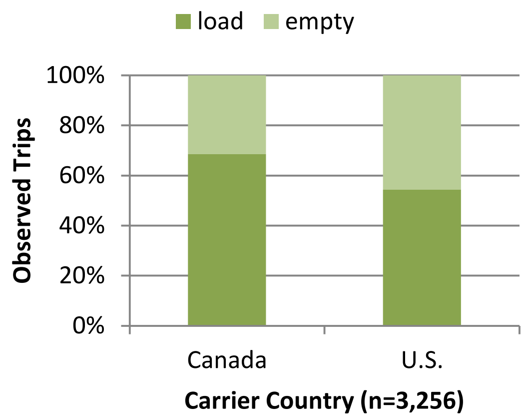

Figure 18: Load Status by Carrier Country

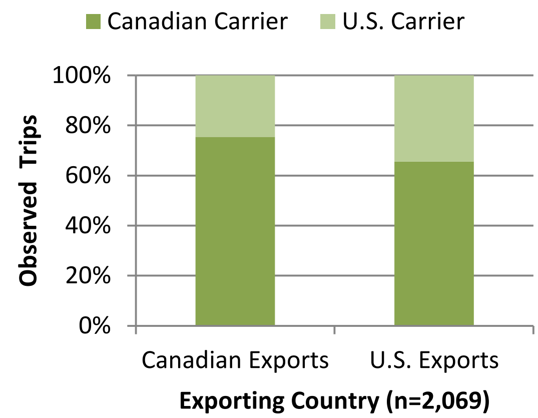

Figure 19: Exports by Carrier Country

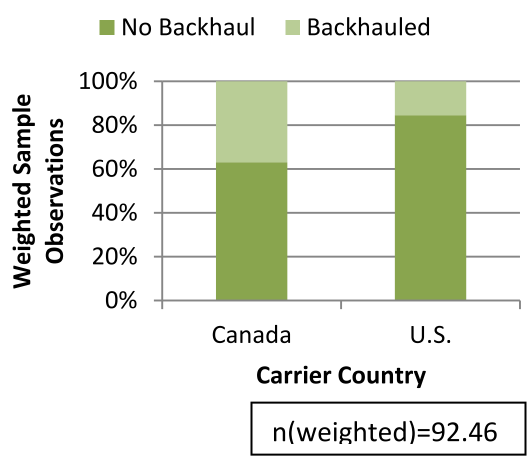

Figure 20: Backhaul by Carrier Country

Policy Factors

FAST

Before analyzing the FAST data from the survey results, the proportion of FAST in the survey was compared to the proportion of observed FAST use. Table 2 shows that the weighted carrier data in the survey indicated 19.91% FAST use. Weighting the observed carrier data gives a 15.53% FAST rate, which is well within the 90%, 95% and 99% confidence levels for what we would expect from the observational data. The following analyses are based upon this finding that FAST rates in the survey data represent a statistically significant sample of the observational data.

Table 2: Statistical Significance of FAST Use

	Carrier Weighted	
	Observed	*Survey*
FAST (n)	421	30.1633333
standard (N)	2289.52043	121.336667
Total (n)	2710.52043	151.5
% FAST	15.53%	19.91%
	Confidence Range	
% FAST	*Min*	*Max*
90% CI	14.56%	25.26%
95% CI	13.54%	26.28%
99% CI	11.54%	28.28%

The observational data from 2009 show that at Pacific Highway, 14% of all trucks used the FAST lane (25% of Southbound trucks and 3% of Northbound trucks). However, examining loaded trucks alone, only 6.5% of loaded trucks in the observational data set used the FAST lane (1.2% of northbound trucks and 14% of southbound trucks). For each direction of travel, approximately two-thirds of all trucks using FAST were empty.

The high rate of empty trucks using the FAST lane suggests that the FAST program at Pacific Highway could be providing an incentive to deadhead across the border rather than seek out a backhaul load. Similar to Figure 10 above, in addition to identifying northbound trips by origin facility type and distance from the border for all trips which contained an empty southbound leg, Figure 21 categorizes these trips by southbound lane choice. Doing so reveals that, of the trucks which crossed southbound empty a short distance into the U.S. using the FAST lane as part of a trip where goods were moved northbound, the vast majority of these trips picked up goods at a trucking facility. This suggests FAST trucks (most of which are empty) are more likely to visit trucking facilities than those trucks using the general purpose lanes.

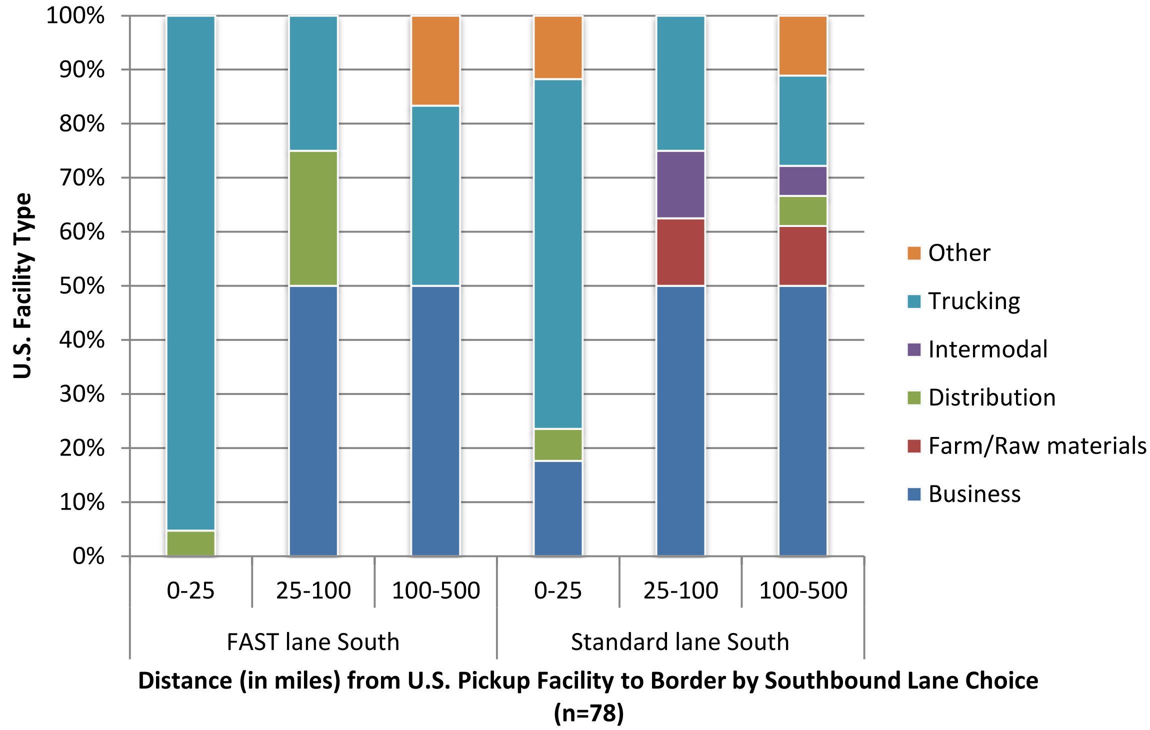

Figure 21: U.S. Facility Type by Distance and Southbound lane Choice, for Southbound Empties

Another way to examine the operational incentives provided by FAST is to examine the relationship between distance and load status between trucks that use the FAST lane and those that do not. As before, the focus is on activites on the U.S. side of the border because of the longer distances involved and thus the ability to better differentiate the impact of distance on load status. Examining southbound Pacific Highway trips and aggregating trips into 50 mile bins, Figure 22 shows that, whereas all empty trucks have a higher likelihood of crossing empty if destined for a facility near the border, those using FAST show a stronger sensitivity to the relationship between load status and distance. This suggests that the ability to cross the border quickly and reliably with the FAST lane is creating an incentive to cross the border empty. In other words, not only does the advantage of crossing the border empty create an incentive to cross empty, but FAST further exaggerates these incentives to cross the border empty. For trucks in the standard lanes, each 100 miles reduces the empty ratio by 10%, whereas for the FAST lanes, each 100 miles reduces the empty ratio by almost 30%.

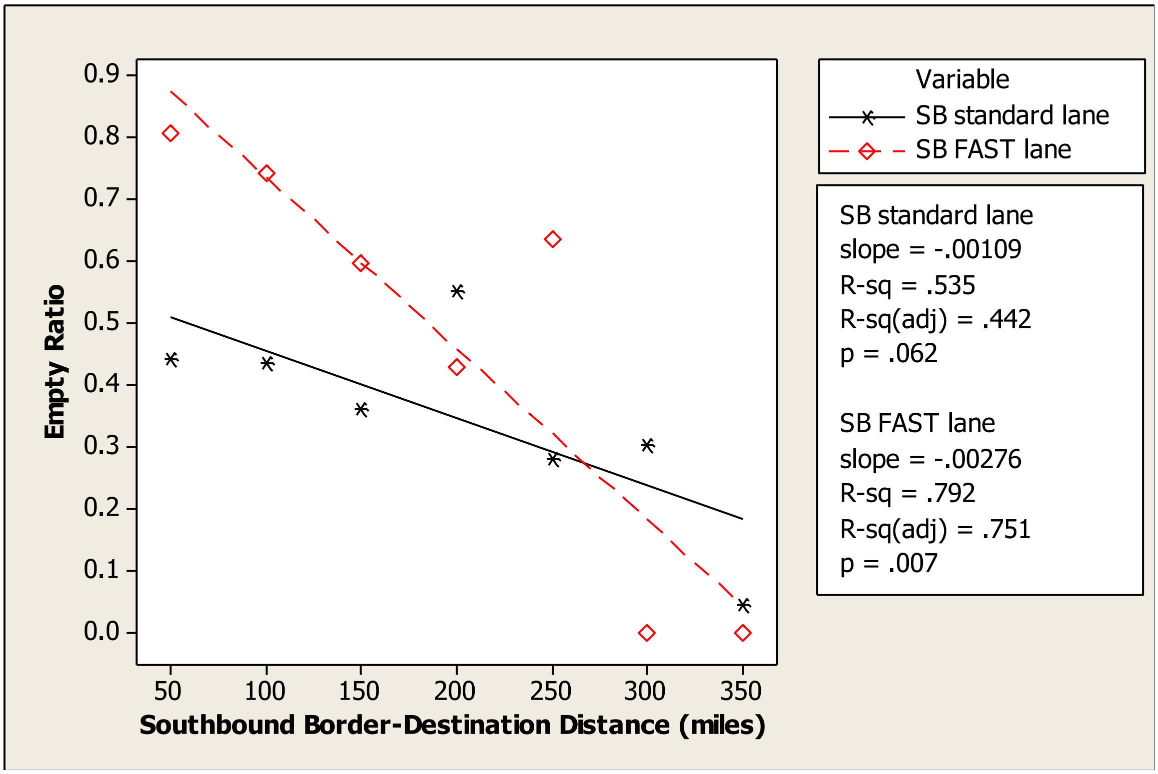

Figure 22: Southbound Distances and Load Ratios by Lane Choice

Looking next at the commodities carried through the FAST lane at Pacific Highway, Figure 23 shows that the most common commodity carried by a carrier of either country in either direction is manufacturing goods, followed by wood and unknown goods (where the unknown goods are mostly described as waste/scrap materials, many going to Tacoma, WA). Manufacturing goods were slightly more prevalent at Pacific Highway than at the average Cascade Gateway crossing: whereas manufacturing goods comprised 51.5% of all loaded trips at Pacific Highway, 46% of all loaded trips through all commercial Cascade Gateway crossings (which includes the Sumas/Huntington and Lynden/Aldergrove crossings in addition to Pacific Highway) were categorized as manufacturing goods.

The reverse is true for wood products: 10% of loaded Pacific Highway trips were wood products, compared to 16% of the average of all loaded Cascade Gateway trips.

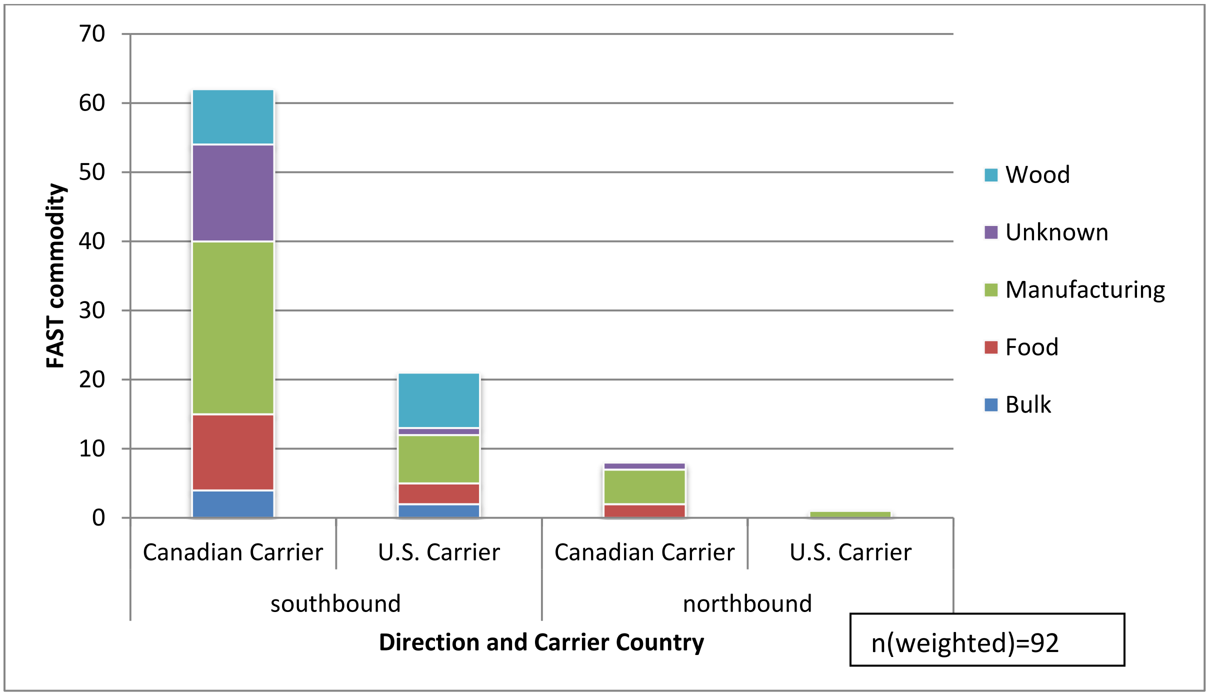

Figure 23: FAST Use by Commodity, Carrier Country and Direction

Further examining low FAST use, and as has been suggested above, shipper enrollment in CSA or C-TPAT is the weakest component of FAST compliance. In their 2008 report on FAST, the Whatcom Council of Governments reported that shippers do not see much benefit from FAST and that any attempt by carriers to charge for FAST service would result in a loss of business. Their survey data indicated that while almost all carriers in the surveys reported less than 10% of shippers (as clients of surveyed carriers) enrolled in C-TPAT or CSA, 80% of these carriers were enrolled in C-TPAT and 60% in CSA (Whatcom Council of Governments 2008). Figure 24 and Figure 25 paint a complimentary picture showing that, while a majority of carriers are enrolled in FAST, very few shippers are. This verifies that shipper enrollment in FAST could be one of the largest hindrances to FAST compliance and use. This also indicates that a majority of carriers are enrolled in FAST even though their client shippers are not, further suggesting that carriers deliberately use the FAST program for the sole purpose of crossing the border empty.

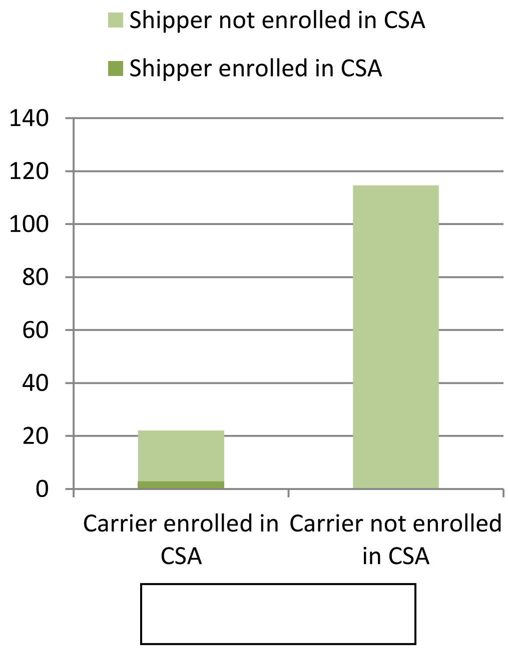

Figure 24: CSA Shipper and Carrier Enrollments

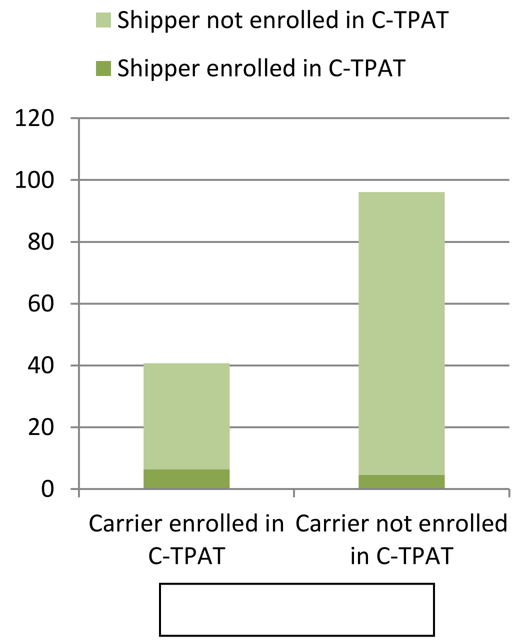

Figure 25: C-TPAT Shipper and Carrier Enrollments

Findings and Recommendations

Operational Findings

Analysis of near border operations provides evidence of clustering of logistical activities near the border, indicating that the logistical impact of the border contributes to unnecessary air emissions which are a direct result of inefficient operations. Using population as a surrogate for economic demand, near-border locations produce several orders of magnitude more demand for cross-border truck trips. The majority of near-border trucking activity occurs at trucking facilities, indicating demand for staging activity created by the border.

The research also reveals a linear relationship between distance and load status. The further into a country a truck travels to deliver goods, the more likely it is to obtain a backhaul load for the return journey. Trips which do not, but could, transport a backhaul load contribute to emissions which could be reduced if fewer trucks were used to more efficiently make the same number of loaded trips. Backhaul rates also differ across commodity category, meaning that transport is more logistically efficient in certain sectors than others. Using survey data to infer what commodity an empty truck could be able to transport, trucks carrying commodities such as manufactured and miscellaneous goods did not use backhaul capacity as efficiently as trucks carrying wood products. Comparing border-destination segments with total origin-destination trip legs suggests that the border itself amplifies the linear relationship between distance and load status.

Despite the general trade imbalance characterized by more goods flowing north than south, the prevalence and loaded rates of trips by Canadian carriers indicates that they carry more goods more efficiently than U.S. carriers and thus produce a smaller share of unnecessary emissions. While Canadian carriers carry a majority of U.S. exports, they, as can be expected, carry an even higher percentage of Canadian exports. Accordingly, Canadian carriers operate more efficiently, exhibiting higher backhaul rates and relatively fewer empty trips. Since trip endpoints in Canada are all close to the border, U.S.

carriers operating in Canada don't have that distance-on-the-other-side-of-the-border factor working in their favor.

FAST Findings

The FAST program at Pacific Highway is underutilized when considering a third of the physical infrastructure is dedicated to these trucks and, compared to other major northern borders, that the majority of its users cross without a load. Addressing concerns of duration and predictability of border crossing times, empty trucks are able to use FAST to quickly deadhead across the border. From the perspective of environmental logistical efficiency, trips using the FAST lane are highly inefficient and are responsible for a relatively high proportion of unnecessary emissions.

In terms of the metrics of inefficient near border operations – near-border staging and empty trips – the data suggest that these inefficiencies are increased by the border, and that FAST use correlates with amplified effects of these metrics. For trucks which deadheaded across the border to locations not far beyond the border crossing, those using the FAST lane were more likely to be destined for a trucking facility, whereas those using the standard lanes were more likely to be destined for distribution or business locations. Also, whereas proximity to the border correlates with higher rates of crossing the border empty, use of the FAST lane exaggerates this relationship. This suggests that the FAST program at Pacific Highway incentivizes trucks to cross empty rather than obtain a backhaul load.

Policy Recommendations

After researching border policies and studying efficiency of border operations, this research makes two policy-oriented suggestions to reduce emissions through improvements in border efficiency. The first suggestion is a proposal with a long time horizon involving a future modification to the FAST program, while the second suggestion lends further support to the preexisting concept of relaxing cabotage laws.

As Roelofs and Springer found in their study to convert the southbound FAST lane into a combined FAST/variable toll lane, such a project would not be feasible without adding capacity. Given the economic slowdown in the few years prior to this research and the corresponding drop in border congestion, there is not much need at this time to consider expanding capacity. However, if at some point in the future capacity were to be expanded, the lessons learned here regarding empty trucks could be used to incentivize more efficient travel across the border.

A hypothetical expansion in capacity (by adding a lane in the southbound direction, for example) could be accompanied by revision to the FAST program policy at Pacific Highway.

If an additional general purpose lane were to be added, the FAST lane could incorporate a toll on empty trucks to deter them from using the FAST lane while empty and thus encourage loaded backhaul trips. Although applying a toll on empty trucks is a concept which could improve logistical efficiency in a general sense, applying such a toll would be much simpler at an international border since a border offers fewer options to avoid a tolled gateway. Domestically operating empty trucks could more easily find alternate routes than could an empty truck utilizing the FAST lane. The Pacific Highway border crossing thus offers an ideal venue for implementation of a toll on empty trucks.

At Pacific Highway, in the current southbound configuration of two standard lanes and one FAST lane, each standard lane handled approximately 38% of total traffic while the FAST lane handled approximately 24% of total traffic. If a further standard lane were added, based on the observational data, each standard lane would be responsible for approximately 25% of total traffic. As an upper bound, assuming that every empty truck chose to not use the FAST lane, each of the three standard lanes would handle, at most, 31% of total traffic. In other words, by adding an additional standard lane and shifting all empty traffic into these lanes, each lane would handle at most 31% of traffic (including all empties) compared to the current 38% of total traffic per lane. The FAST lane would then be reserved for loaded vehicles only in order to encourage loaded backhauls without increasing standard lane congestion.

However, vehicles which must cross empty could be granted special exemption from such a toll. Vehicles which transport goods such as chemicals and fuel must reposition empty given the specialization of their equipment and the largely unbalanced trade flow and are often observed making multiple cross-border trips in a single day. From the observational data, basic chemical and fuel trips comprised only 5% of all loaded trips, and these trips were only carried by 2.7% of observed carriers. Administering such a waiver would not be exceedingly difficult given the small number of carriers allowed an empty fee exemption. Agricultural carriers would similarly be exempt since they do not represent a large portion of trade at the border (1.7% of loaded trips at Pacific Highway carried by 1.1% of carriers) and the nature of agricultural commodities often necessitate the empty repositioning of specialized equipment due to varying and unidirectional commodity flows. Carriers specializing in agricultural commodities would thus be considered for empty fee waivers.

Supporting this proposal is the near parity in north-south movement by manufactured, miscellaneous and semifinished goods – commodities which see low utilization of backhaul capacity and for which various types of equipments are assumed to be usable fairly interchangeably. This is a point which segues into the second suggestion: relaxation of cabotage law. Prokop concluded that carriers and shippers in both the U.S. and in Canada would all benefit from cabotage reform, but did not predict who would gain more (Prokop 1998). Both minor and major forms of cabotage reform could achieve different levels of efficiency improvement, and both are suggested here.

The most feasible, and minor, cabotage reform with the most political palatability would be to allow for the repositioning of empty equipment by foreign carriers. As cabotage law is intended to protect domestic transportation markets from foreign firms, these reforms would protect the domestic movement of goods while allowing foreign carriers to act in more efficient ways. If, for example, a

Canadian driver drops off a load in a U.S. city, they can either drop off their trailer and seek out another backhaul load or return home. They can also wait for their trailer to be unloaded which frees them up to use their own empty equipment to seek out a backhaul load from another location. What they are not allowed to do is pick up an empty trailer where they made their initial drop and relocate that empty trailer to secure another backhaul load. That is considered a purely domestic movement by a foreign carrier and driver. Relaxing this policy would give foreign drivers more options when operating in a foreign country, thus increasing their chances of obtaining a backhaul load and operating in more efficient ways which ultimately produce less unnecessary emissions. The American Trucking Association and the Canadian Trucking Alliance, both national trucking industry organizations, jointly petitioned the U.S. CBP for a reinterpretation of this rule in 2008 but the petition was rejected and they are reportedly continuing to pursue reinterpretation of the rule (American Trucking Association n.d.).

Going one step further and allowing for purely domestic moves by foreign carriers, though politically sensitive, would be a major cabotage law reform and could potentially achieve even greater operational efficiencies. Cabotage law reform would likely only impact a small portion of both U.S. and Canadian trucking markets. The positive impacts of cabotage reform would likely be significant for the cross-border trucking industry and the environment with very little negative impact on domestic trucking industries by added foreign competition. One study, for example, examined the removal of cabotage laws in the European Union where, despite an 86% increase in road cabotage transport from 1999 to 2004, cabotage only represented 0.76% of total road transport (ECORYS Nederland n.d., 30). And despite fears by smaller countries that their trucking industries would be negatively impacted by cabotage reform, the European story makes the case that cabotage can be more important to carriers in countries with smaller domestic markets (ECORYS Nederland n.d., 22).

Based on the findings by Beilock and Prentice in their “Open Prairies” experiment proposal (Beilock and Prentice 2007) and the success of cabotage reform in the European Union (ECORYS

Nederland n.d.), a regional experiment could be proposed whereby major cabotage movements are allowed. As with the Open Prairies experiment, a similar experiment in the Cascade Gateway would have to have significant restrictions. Reasonable geographical constraints would have to be established and the number of allowable purely domestic movements by a foreign carrier would have to be limited. From the observational data, over 90% of all cross-border Cascade Gateway trips were destined for locations within 300 miles of the border. Over 97% of empty northbound and 92% of empty southbound trips were also destined for locations less than 300 miles of the border. Reducing this distance, almost 85% of empty southbound trips were destined for locations within 150 miles of the border while over 95% of empty northbound trips were destined for locations within 150 miles of the border. The concentration of regional trips using the Cascade Gateway crossings, as well as the high proportion of those trips which are empty near the border, suggest that a regional cabotage experiment could be established with minimal impact to domestic trucking competition.

Again, the findings in this research regarding low utilization of backhaul capacity by certain major and interchangeable commodity categories suggests that, by opening domestic markets to limited cabotage, foreign carriers could find profitable ways to domestically reposition themselves in order to secure a backhaul load, thus decreasing empty trips across the border. The results of such an experiment could be used to inform a larger bi-national discussion on major cabotage law reform.

Chapter 2: Observations of Queue Discipline at Blaine

Recent analysis of the operational data conducted by Hugh Conroy (WCOG) and Mark Springer (WWU) was able to make the following conclusions regarding important behaviors at the Blaine crossing often overlooked in simulation models (Conroy, 2010). We report his observations here as outcomes of the data collection that answer the original question posed in our research.

Conroy's analysis focuses on U.S. inbound commercial traffic at the Pacific Highway, the primary commercial land-border. Data include arrival time at queue-end, arrival time at the primary inspection booth, departure time from the primary booth, vehicle-type, commodity/empty, inspection-lane type (FAST or standard), carrier name & base city, trip origin, and trip destination. He was able to make the following conclusions as described in his paper submitted to and presentation given at the Seminar on Canada-US Border Management Policy Issues held April 12 at the Woodrow Wilson Center in Washington, D.C..

1. Transition time is important

Using the data, transition times were calculated by subtracting the time values of trucks' booth-departures from the booth-arrival time of the next truck. This calculation is specific to each booth for all the hours the survey was underway. Summarized observations of U.S.-bound commercial vehicles at Pacific Highway indicate that the average transition time is about 25 seconds which, on average, comprises between 20 and 25 percent of per-truck service time. Clearly this is a significant value and should not be neglected in simulation studies.

A second observation Conroy makes is that there are periodic long transition times which would have significant impacts on delay. For example, while the average transition time is about 25 seconds, the longer transition times, which can take up to 10 minutes, occur periodically and on the hour. These correspond to times when inspectors make shift changes. Inspectors must log-off and log-on to the computer as well as do cash-register reconciliations.

2.Passenger vehicles in commercial activity

Conroy's second key observation is that passenger vehicles and pickup trucks have disproportionately long inspection times. While these vehicles comprised eight percent of all vehicles using the commercial lanes they account for eleven percent of the cumulative inspection time (as observed during the survey period). Passenger vehicles' average inspection time (157 seconds) is 36 seconds higher than the average inspection time for tractor vans (121 seconds)—a 30 percent difference and a 38 percent increase over the overall average inspection time of 114 seconds. He also finds these vehicles are typically moving low value shipments.

Conroy suggests that operational changes could be implemented to reduce the impact of shift changes, and that passenger vehicles in the service of commercial activity could be served differently.

Chapter 3: ACE e-Manifest and Primary Processing Time at Pacific Highway

ACE is the commercial trade processing system being developed by Customs and Border Protection to facilitate legitimate trade and strengthen border security.

In 2001 and 2006, two similar data collection efforts to the one that enabled this research were undertaken at the commercial vehicle border crossing at Blaine, Washington. These showed that although border crossing volumes decreased between 2001 and 2006, border crossing times increased substantially within in the same period. Since 9/11 there has been increased emphasis on security and as a result processing times over the borders have increased while commercial volume has not. Data for this analysis were collected at the Pacific Highway commercial border crossing during three separate projects in 2002, 2006 and 2009 (see Table 3 for dates).

Table 3: Data Collection Dates

Year:	2002	2006	2009
Northbound	June 10 - 14	June 5 - 8	June 15, 16, 24, 25
Southbound	June 17 - 20	June 19 - 22	June 17, 28, 22, 23

The ACE e-Manifest program did not exist in 2002. At the time of the 2006 data collection project, the U.S. Customs and Border Protection (CBP) Agency had only partially implemented the ACE e-Manifest system (U.S. Customs and Border Protection 2006). As of 2009 ACE was fully implemented at Pacific Highway, though there was not a comparable program in the northbound direction. Canadian Border Services Agency (CBSA) at the time was in the process of implementing its own e-Manifest system which was not active at the time of the data collection (Canada Border Services Agency 2010).

A major limitation to this analysis is that the raw data from 2002 were not available. This report therefore relies upon analysis of the data in a 2003 SAIC report on this data set. 2006 and 2009 datasets were available and provided by the Whatcom Council of Governments.

Analysis

In this analysis, the primary processing, or inspection, times measure the period from when a vehicle arrives at the inspection booth to when a vehicle leaves the inspection booth. Table 4 presents a summary of all data by year, direction, and lane type. The source for the 2002 data was obtained indirectly from a report (SAIC 2003) while the 2006 and 2009 data were calculated from the original datasets as obtained from the Whatcom Council of Governments.

Table 4: Unadjusted Summary Statistics

Year	Direction	Lane(s)	N	Mean (s)	StDev
2002	Northbound	All	2725	49	n/a
2002	Southbound	All	2974	57	n/a
2006	Northbound	All	2539	63.41079	53.909
2006	Southbound	FAST	1131	96.8992	113.5771
2006	Southbound	General	2160	134.5713	104.6049
2006	Southbound	All	3291	121.6247	109.2311
2009	Northbound	FAST	29	77.06897	50.01995
2009	Northbound	General	1499	86.48766	52.568
2009	Northbound	All	1528	86.3089	52.52089
2009	Southbound	FAST	350	92.96857	76.94311
2009	Southbound	General	1204	117.1993	70.99851
2009	southbound	all	1554	111.742	73.05955

In the analysis of 2009 data, a correction was applied to compensate for inspection times which were considered to be unusually high due to both the presence of surveyors in the booth and the training of new inspectors (Conroy 2009). Given that no such consideration was given for the 2002 and 2006 data, this report analyzes the unadjusted data since no similar corrections were applied to earlier data sets. Table 5 and Table 6 show the average inspection times as reported in the 2009 International Mobility and Trade Corridor Project (IMTC) report (Whatcom Council of Governments and Border Policy Research Institute 2010). The unadjusted data differs considerably from these adjusted data as used in the report. For example, the IMTC reported average 2009 Southbound FAST and General inspection times as 76 and 100 seconds, whereas the unadjusted data in Table 4 reveal times of 93 and 117 seconds, respectively.

Table 5: Pacific Highway Northbound (IMTC)

Year	Lane	Avg inspection time
2002	General	49
2006	General	64
2009	Fast	69
2009	General	76

Table 6: Pacific Highway Southbound (IMTC)

Year	Lane	Avg inspection time
2002	General	57
2006	Fast	87
2006	General	120
2009	FAST	76
2009	General	100

From 2002 to 2006, inspection times greatly increased. As the 2007 IMTC report (Halcrow Consulting Inc. 2007) notes,

> *The 2006 FAST and the non-FAST booth processing times were materially longer than the 2002 average of 57 seconds per vehicle. In other words, the 2006 FAST processing time is almost 30 seconds per vehicle, or close to 50% longer than 2002. The non-FAST rates have effectively doubled since 2002.*

However, from 2006 to 2009, average northbound inspection times increased while average southbound inspection times decreased (see Figure 26). 2006 northbound inspection times (when no FAST lane was available) were shorter than 2009 northbound inspection times in both the FAST and general lanes. In the southbound direction, which had a FAST lane in 2006, inspection times for both FAST and general lanes decreased. Though we cannot control for other variables, this suggests that the presence of ACE southbound but not northbound could partially explain why northbound inspection times rose while southbound inspection times fell.

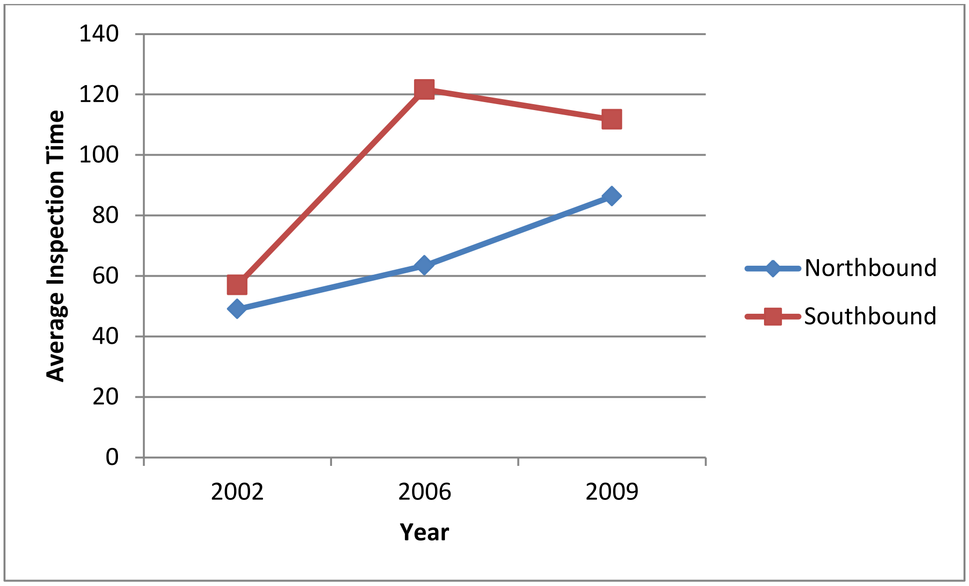

Figure 26: Average Inspection Times (n=20984)

Variability also improved (decreased) in southbound inspection times from 2006 to 2009 while variability in northbound inspection times remained relatively flat (see Figure 27).

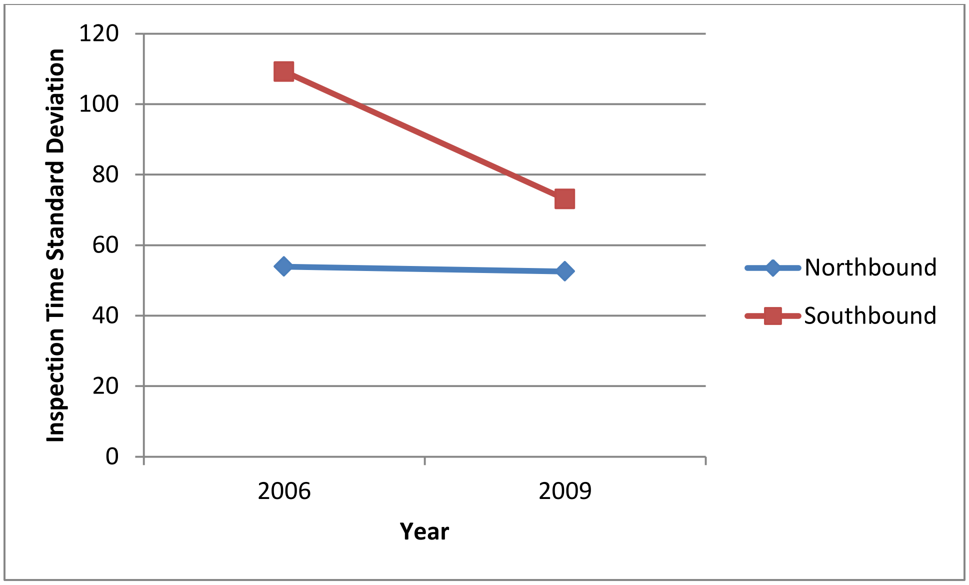

Figure 27: Inspection Time Standard Deviations (n=15285)

The changes in inspection time distributions reveal more detail about how ACE may have impacted crossing times. Though the raw data are not available, Figure 28 and Figure 29 duplicate the histograms of Northbound and Southbound inspection times as included in the 2003 SAIC report. Using the available data, Figure 30 and Figure 31 display histograms and boxplots, respectively, of inspection times for 2006 and 2009 data by direction. Northbound inspection time distribution shifted slightly to the right from 2006 to 2009 while southbound inspection time distributions show a reduction in variability.

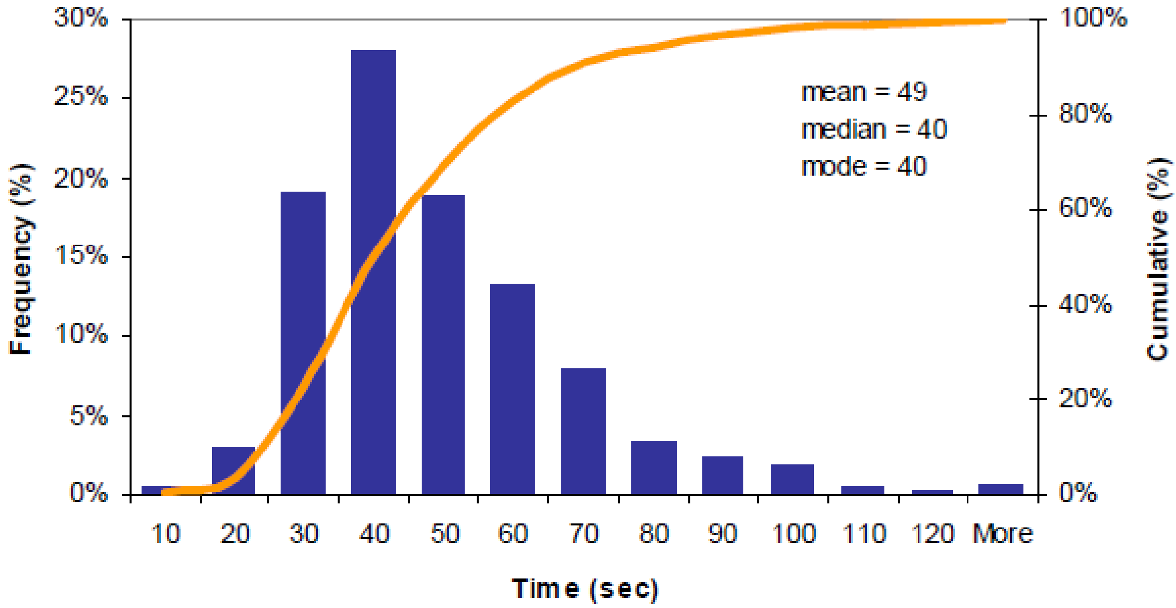

Figure 28: 2002 Histogram of Northbound Inspection Times

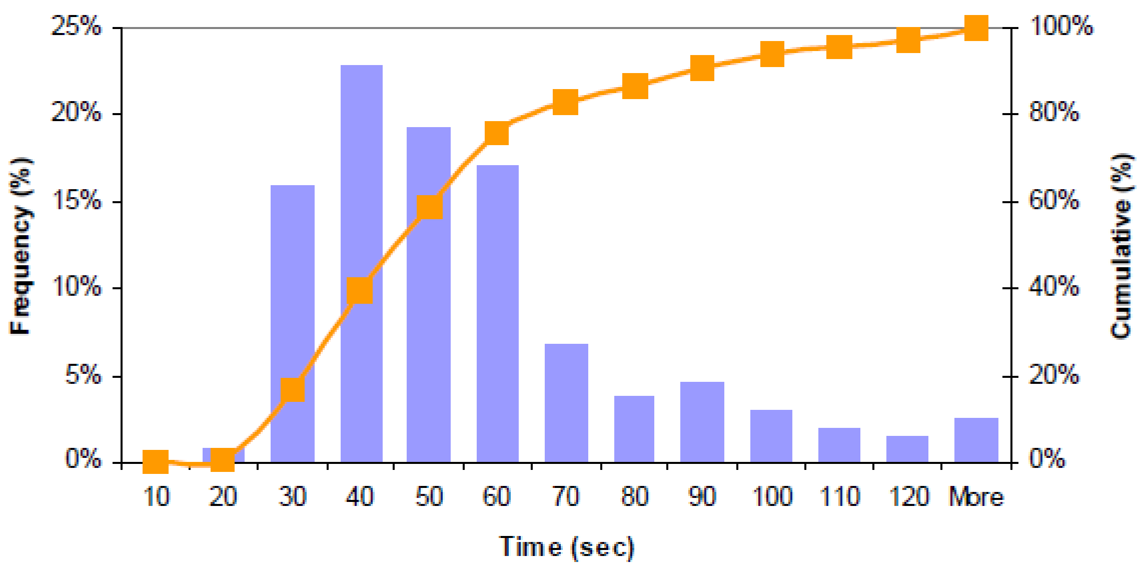

Figure 29: 2002 Histogram of Southbound Inspection Times

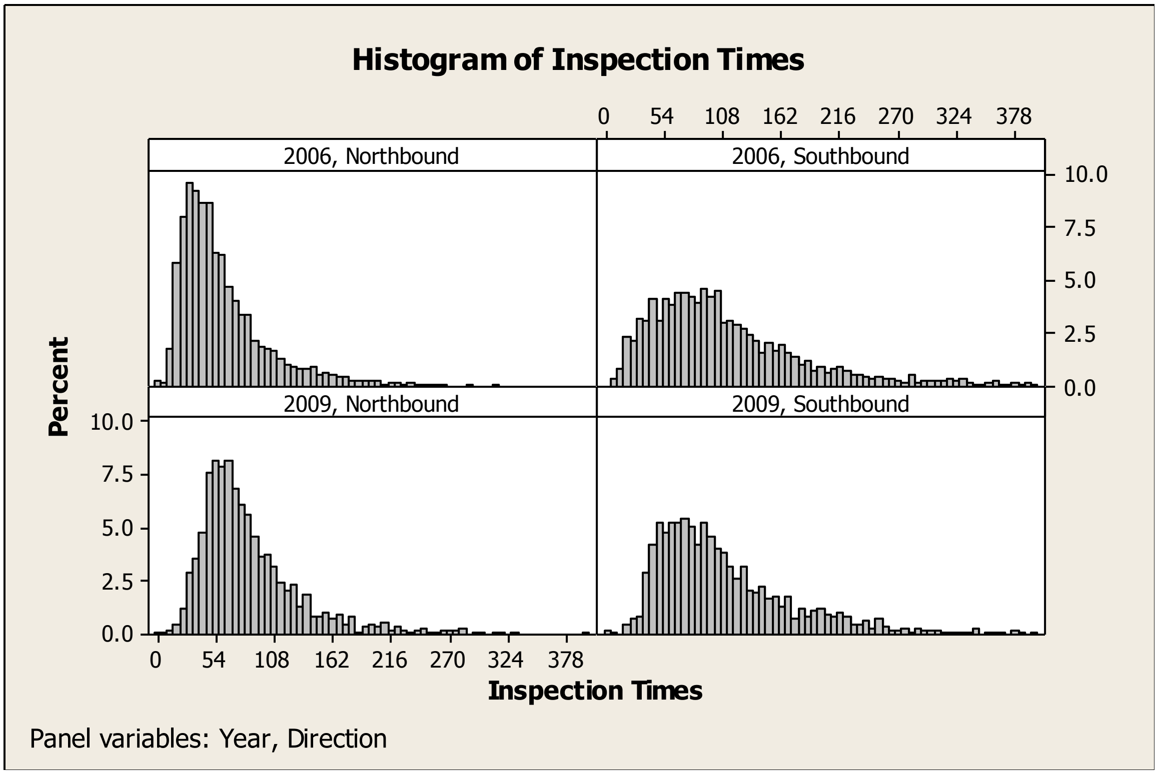

Figure 30: Histograms of 2006 and 2009 Inspection Times

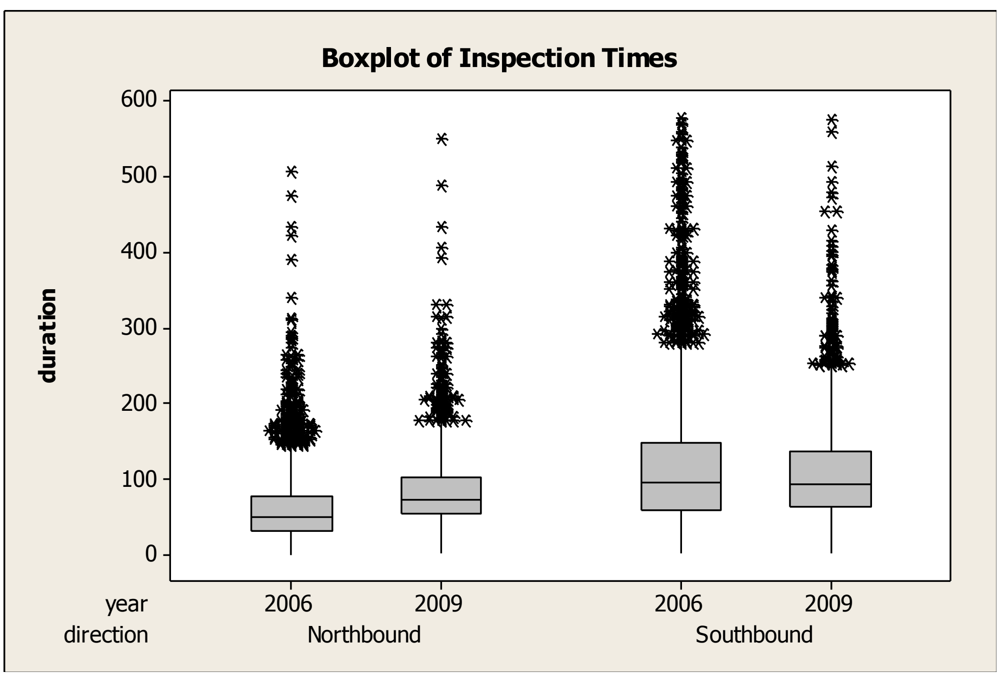

Figure 31: Boxplots of 2006 and 2009 Inspection Times

As FAST was only used in the southbound direction in 2006, Figure 32 and Figure 33 compare histograms and boxplots of 2006 and 2009 southbound FAST processing times. The data show an improvement (reduction) in the variability of FAST processing times. Given the relative novelty of FAST, though, it is difficult to say to what extent the improvements in FAST processing times are due to the maturation of the FAST program or other factors rather than the introduction of ACE.

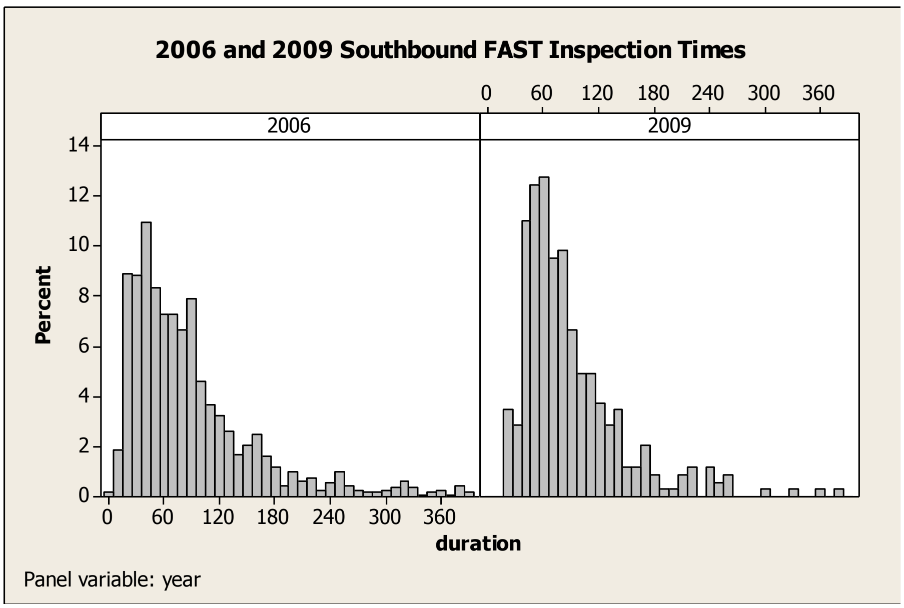

Figure 32: Histograms of Southbound FAST Inspection Times

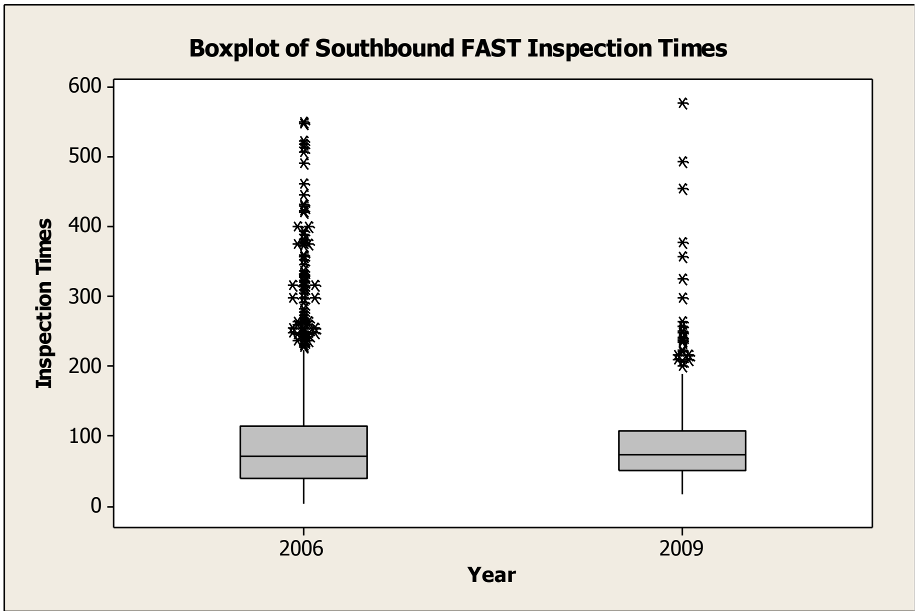

Figure 33: Boxplots of Southbound FAST Inspection Times

Conclusions

From 2002 to 2006, primary processing times (inspection times) increased in both northbound and southbound directions. From 2006 to 2009, average duration and variability of processing times decreased in the southbound direction (where ACE e-Manifest had been implemented). In the northbound direction (without a comparable e-Manifest program), average inspection times rose while variability remained relatively unchanged. This report cannot conclude that ACE e-manifest directly impacted primary processing times but notes that the introduction of ACE correlates with an improvement in primary processing times where ACE was implemented.

What is the overall benefit of the ACE program to southbound delay and emissions? The impact of processing time on delay is highly dependent on current system conditions, as demonstrated by Springer, 2010. If we can assume the difference in processing times between 2006 and 2009 can all be described by the ACE implementation (which of course is an upper bound), then the ACE program has reduced processing times by 20 seconds for General Purpose trucks and 11 seconds for FAST trucks.

According to Springer (2010), this represents approximately a 15 minute maximum wait time difference and a 10 minute average wait time difference. Springer (2010) has recently completed a simulation of the Blaine crossing that demonstrates how these average and maximum wait times change with increasing traffic, FAST participation, and the use of congestion pricing.

Given that approximately 300,000 vehicles crossed southbound at Blaine in 2009, if the average wait time is decreased by 10 minutes per vehicle, this represents 3,000,000 vehicle minutes of delay and, approximately 300 tons of CO_2 (based on an estimated 15 tons of CO2 per 2400 hours of idling, EPA 2002).

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Appendix A: SCTG Codes

Standard Classification of Transported Goods (SCTG) codes (courtesy of Statistics Canada[2])

1	Live Animals and Live Fish
2	Cereal Grains
3	Agricultural Products Except Live Animals, Cereal Grains, and Forage Products
4	Animal Feed and Feed Ingredients, Cereal Straw, and Eggs and Other Products of Animal Origin n.e.c.
5	Meat, Fish, Seafood, and Preparations
6	Milled Grain Products and Preparations, and Bakery Products
7	Prepared Foodstuffs n.e.c. and Fats and Oils
8	Alcoholic Beverages
9	Tobacco Products
10	Monumental or Building Stone
11	Natural Sands
12	Gravel and Crushed Stone
13	Non-metallic Minerals n.e.c.
14	Metallic Ores
15	Coal
16	Crude Petroleum
17	Gasoline and Aviation Turbine Fuel
18	Fuel Oils

[2] http://www.statcan.gc.ca/subjects-sujets/standard-norme/sctg-ctbt/sctgclass-ctbtclasse-eng.htm

19	Products of Petroleum Refining n.e.c. and Coal Products
20	Basic Chemicals
21	Pharmaceutical Products
22	Fertilizers and Fertilizer Materials
23	Chemical Products and Preparations n.e.c.
24	Plastics and Rubber
25	Logs and Other Wood in the Rough
26	Wood Products
27	Pulp, Newsprint, Paper, and Paperboard
28	Paper or Paperboard Articles
29	Printed Products
30	Textiles, Leather, and Articles
31	Non-metallic Mineral Products
32	Base Metal in Primary or Semi-finished Forms and in Finished Basic Shapes
33	Articles of Base Metal
34	Machinery
35	Electronic and Other Electrical Equipment and Components, and Office Equipment
36	Vehicles
37	Transportation Equipment n.e.c.
38	Precision Instruments and Apparatus
39	Furniture, Mattresses and Mattress Supports, Lamps, Lighting Fittings, and Illuminated Signs
40	Miscellaneous Manufactured Products
41	Waste and Scrap

42	Miscellaneous Transported Products

Survey Data Categorization by SCTG code:

Categorization	SCTG Code(s)
Farm	1 2 3 4
Food/Beverage	5 6 7 8
Miscellaneous	9 43 99
Raw materials	10 11 12 13 14
Energy/Fuel	15 16 17 18 19
Chemical	20 21 22 23
Semi finished	24 28 30 31 32 33
Wood	25 26
Printed Matters	27 29
Manufactured	34 35 36 37 38 39 40
Waste/Scrap	41
Empty	42

SCTG codes in the observational data were categorized by the IMTC into the following commodity groups, as originally developed in the 2000 IMTC Trade Cross-Border Trade and Travel Study[3]:

Farm Products -raw agricultural commodities
Food Products -processed food and kindred products
Wood Products -forest products, lumber and wood products (excluding furniture)

[3] http://resources.wcog.org/border/pis_2000report.pdf

Bulk Products -minerals, fuels (raw and processed), stone and gravel, clay, concrete, and glass
Manufactured Products
Other Miscellaneous Freight -waste and scrap, mail, small packages, mixed freight

Appendix B: 2009 IMTC Commercial Vehicle Operations Survey: Final Report

2009 International Mobility & Trade Corridor Project (IMTC) Commercial Vehicle Operations Survey

Final Report

March, 2010

Whatcom Council of Governments
www.wcog.org

Border Policy Research Institute
www.wwu.edu/bpri/

2009 International Mobility & Trade Corridor Project (IMTC)
Commercial Vehicle Operations Survey
Final Report

INTRODUCTION

The 2009 International Mobility & Trade Corridor Project (IMTC) Commercial Vehicle Operations (CVO) Survey took place in June, 2009. This project was identified by IMTC participants in order to periodically evaluate CVO at the Cascade Gateway's three ports-of-entry as a priority for informing regional investment strategies, and to analyze the impacts of changes to road and inspection systems.

The International Mobility & Trade Corridor Project

The International Mobility & Trade Corridor Project (IMTC) is a U.S. - Canadian coalition of government and business entities that identifies and promotes improvements to mobility and security for the four Cascade Gateway border crossings between Whatcom County, Washington State and the Lower Mainland of British Columbia. The goals of the IMTC project are to facilitate a forum for ongoing communication between agencies that affect regional, cross-border transportation, safety, and security; coordinate planning of the Cascade Gateway as a transportation and inspection system rather than as individual border crossings; improve and distribute traffic data and information; and identify and pursue improvements to infrastructure, operations, and information technology.

Since 1997, IMTC has served as a model of regional coordination on border issues and has helped secure over $38 million (USD) from U.S. and Canadian partners to pursue the goals listed above.

2009 CVO Evaluation Survey

The Whatcom Council of Governments (WCOG) partnered with the Border Policy Research Institute (BPRI) at Western Washington University, and the University of Washington to conduct a 2009 evaluation of commercial vehicle movement through the Pacific Highway, Lynden/Aldergrove, and Sumas/Huntingdon ports-of-entry. The analysis included measurement of border processing rates, northbound and southbound at all three crossings, as well as the collection of origin-destination and commodity data. Data were collected July, 2009 by a team of Western Washington University students.

This final report, the full project database, and BPRI Border Policy Briefs using the data collected are available from this effort by contacting Melissa Miller, Project Coordinator, at (360) 676-6974.

2006 and 2002 CVO Evaluation Survey

Two prior studies were conducted at Pacific Highway, in 2002 and in 2006. The original study was sponsored by U.S. Federal Highway Administration and completed by SAIC and TSi Consultants to evaluate the potential benefits of ITS deployment at the Pacific Highway port-of-entry. The study specifically looked at current delay and estimated future delay with and without the addition of an electronic commercial vehicle processing lane such as a FAST (Free and Secure Trade) Program lane, and concluded that substantial benefits could be achieved if even 15 percent of commercial vehicles crossing at Pacific Highway were to use a dedicated ITS lane.

Given the changes at Pacific Highway since 2002, IMTC participants advanced a repeat study in 2006 to examine if the border wait times improved five years after the original study and after substantial investments in infrastructure improvements. The study examined changes in queueing patterns, travel delay, and processing times at the border, and also attempted to attribute any improvements to discreet projects or initiatives at the border. The study also collected data to be used for ongoing modeling efforts and to develop a baseline for future project monitoring. Initial results showed that the new alignment of southbound B.C. Highway 15 has improved overall travel time for FAST-approved trucks using the ITS lane. For other trucks, however, through-border travel time increased from 2002, despite roadway improvements.

GEOGRAPHY

Surveying conducted both directions at all three Cascade Gateway commercial ports-of-entry:

Pacific Highway (Interstate 5/State Route 543 & B.C. Highway 15)

Lynden/Aldergrove (State Route 539 & B.C. Highway 13)

Sumas/Huntingdon (State Route 9 & B.C. Highway 11)

FUNDING

- Border Policy Research Institute, Western WA Univ. (WWU)
- Whatcom Council of Governments (WCOG)
- University of Washington (UW)

SURVEY TEAM

- 13 WWU students
- 3 supervisors (David Davidson, Hugh Conroy, Melissa Miller)
- Port-of-entry coordination & facilitation: US Customs & Border Protection, Canada Border Services Agency
- Post-processing: WCOG, 2 WWU students

SURVEY 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

ADDITIONAL DATA COLLECTION

Data were collected in addition to the port-of-entry observations. An online carrier dispatcher survey was distributed to truck drivers at the Pacific Highway port-of-entry; and a survey of passenger buses crossing at Pacific Highway was conducted. Details of both efforts are included in this report. A separate report on the carrier survey data has been prepared by the University of Washington.

Not included in this report are add-on data collection efforts including an analysis of the passenger vehicle anti-idling zone southbound at the Peace Arch port-of-entry; a survey of potential NEXUS travelers at The Lynden/Aldegrove and Sumas/Huntingdon ports-of-entry; and an inventory of border-related signage in Lower Mainland, B.C. and Whatcom County, WA. Separate reports for these projects are available by contacting BPRI or WCOG.

OTHER PRODUCTS AVAILABLE UPON REQUEST

Material from the 2009 IMTC Commercial Vehicle Operations Survey include:

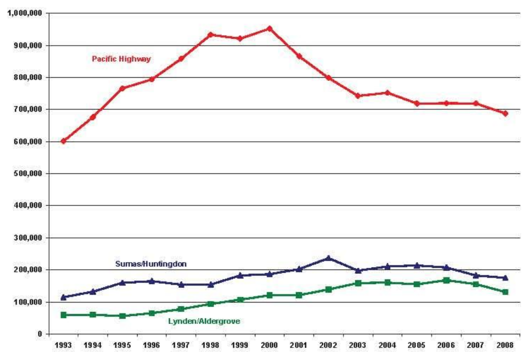
- Final project database
- Database documentation
- Bus database
- Nearborder operations and logistical inefficiencies: an analysis of 2009 CVO survey data - Report from University of Washington
- NEXUS survey database
- NEXUS survey final report
- Online signage inventory
- Peace Arch anti-idling zone survey report
- Border Policy Research Institute policy briefs
- 2006 and 2003 CVO Evaluation survey reports

For these and other materials, contact the Whatcom Council of Governments at (360) 676-6974 or visit the project website online at: www.wcog.org.

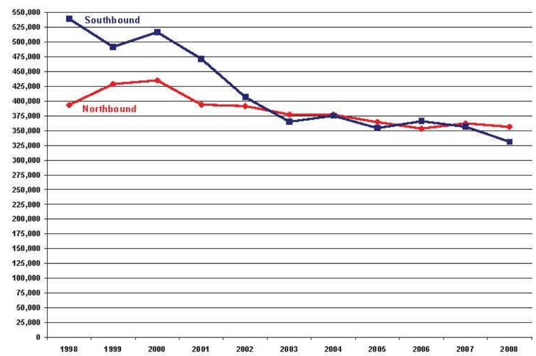
Surveyors collected bus passenger and bus processing data at Pacific Highway.

CASCADE GATEWAY COMMERCIAL VOLUME

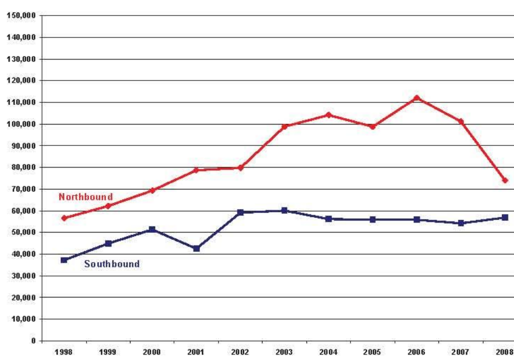
Commercial Volumes, Both Directions, 15 Years



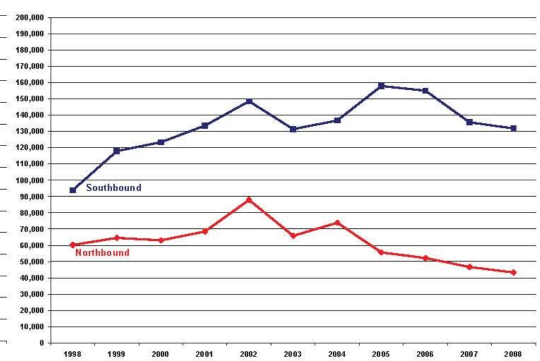
Pacific Highway Commercial Volume, 10 Years



Lynden/Aldergrove Commercial Volume, 10 Years



Sumas/Huntingdon Commercial Volume, 10 Years



VOLUME DURING SURVEY MONTH

		Pacific Highway		Lynden/Aldergrove		Sumas/Huntingdon	
		Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
June	2002	33,603	35,695	6,466	4,288	7,520	11,522
June	2006	31,897	30,646	11,791	5,443	4,317	15,286
June	2009	27,740	27,083	6,016	4,313	4,082	11,729

This number is unusually high.

24% decrease in southbound Pacific Highway truck volume since 2002; 12% decrease since 2006.

Data Sources: U.S. Customs & Border Protection and Statistics Canada

PACIFIC HIGHWAY SURVEY POSITIONS

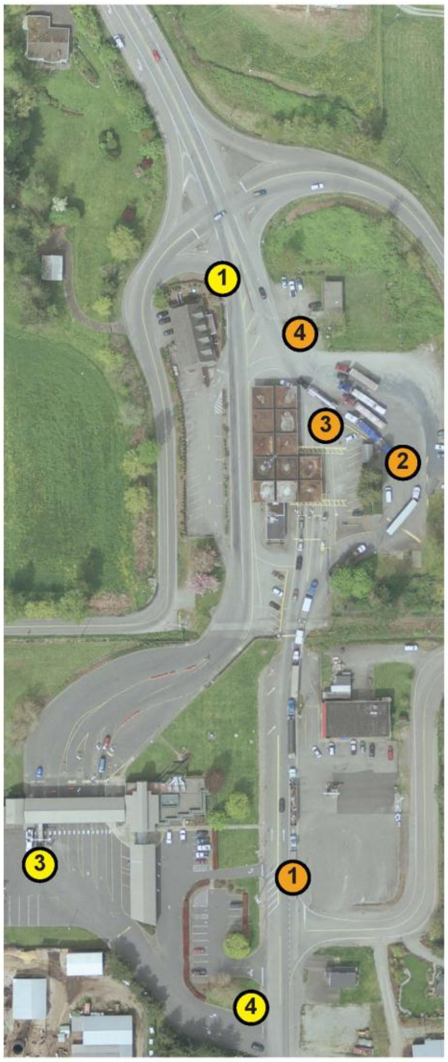
1	QUEUE END - STANDARD	1
2	QUEUE END - FAST	2
3	PARKING LOT	3
4	BOOTHS	4
5	PORT EXIT	5

Booth position includes a processing surveyor outside the booth, and an in-booth data entry surveyor for each booth open.

LYNDEN/ADLERGROVE & SUMAS/HUNTINGDON SURVEY POSITIONS

LYNDEN/ALDERGROVE

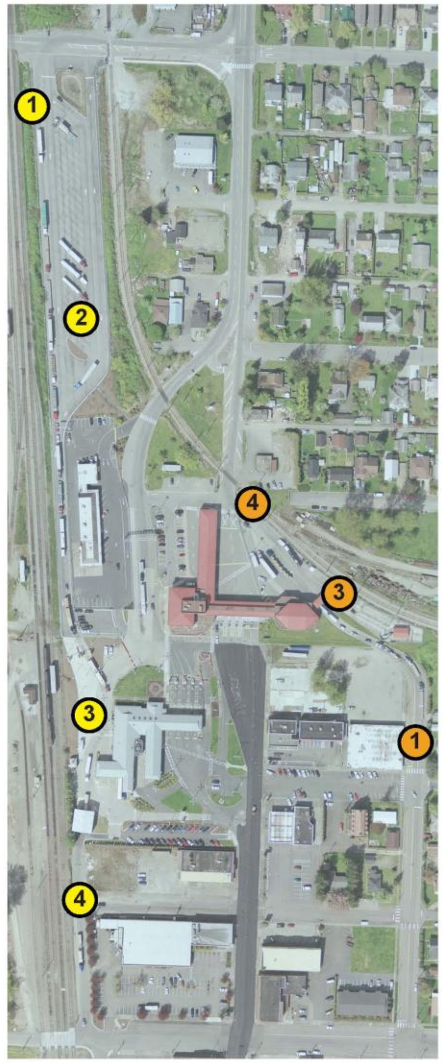
NORTH



SOUTH

SUMAS/HUNTINGDON

NORTH



SOUTH

1	QUEUE END - STANDARD	1	3	BOOTHS	3
2	PARKING LOT	2	4	PORT EXIT	4

DATA FIELDS

Processing Table

TripID	Links Processing record to Booth record
Date	Date of truck trip
Port	Port-of-Entry *Pacific Highway, Lynden/Aldergrove, Sumas/Huntingdon*
Direction	Direction of travel *Northbound, Southbound*
Day of Week	Day of week for the truck trip
Booth No.	Which booth the truck used *1 (FAST lane), 2, 3*
Lane Type	What type of lane the truck used *FAST, Standard (STD)*
Trip No	How many times this truck crossed the border in one day
Identifier	Unique number to represent license plate of vehicle
Plate Jurisdiction	License plate jurisdiction *BC, WA, AB, OR, ID, CA, Canada Other, US Other, Other*
Vehicle Type	Type of truck *Passenger vehicle, RV, Pickup Truck, Light Truck, Tractor Only, Tractor Van, Tractor Container, Tractor Flatbed, Tractor Tank, Truck, Truck with Trailer, Other*
Arrive Time	Time of truck's arrival at the end of the queue
Park Time	Time the truck parked (if applicable)
Unpark Time	Time the truck left the parking lot
Park Duration	Total time the truck spent parked
Park Reason	Reason the driver gave for parking *Duty Free, U.S. Paperwork, Canadian Paperwork, Broker Paperwork, Drive Time Window, Other*
Arrive Duration	Total time between end of queue and arrival at inspection booth
Arrive Booth Time	Time the truck arrived at the primary inspection booth
Depart Booth Time	Time the truck departed the inspection booth
Depart Obstructed	Marked if the truck's departure from the booth was obstructed by another truck ahead
Booth Duration	Total time the truck spent at the booth
Corrected Booth Duration	The booth duration, minus a correction factor to account for surveyor presence

RECORDS COLLECTED	Northbound	Southbound	Total
Pacific Highway	4,586	4,516	**9,102**
Lynden/Aldergrove	807	826	**1,633**
Sumas/Huntingdon	1,281	2,389	**3,670**
Total	**6,674**	**7,731**	**14,405**

TRUCK TRIPS REPRESENTED	Northbound	Southbound	Total
Pacific Highway	1,571	1,623	**3,194**
Lynden/Aldergrove	275	294	**569**
Sumas/Huntingdon	447	818	**1,265**
Total	**2,293**	**2,735**	**5,028**

DATA FIELDS

Booth Table

TripID	Links Processing record to Booth record
RecordID	Unique number for this record
Timestamp	Computer-based timestamp of record entry
Date	Date of truck trip
Time	Time the record was entered
Port	Port-of-Entry *Pacific Highway, Lynden/Aldergrove, Sumas/Huntingdon*
Direction	Direction of travel *Northbound, Southbound*
Booth No	Which booth the truck used *1 (FAST lane), 2, 3*
Identifier	Unique number to represent the license plate of the vehicle
Trip No	How many times this truck crossed the border in one day
License	License plate of the truck
Origin	Truck's origin city
Origin State	State or Province of origin city
Origin Zone	Origin region- *Whatcom, Pt Roberts, Puget Sound, W WA, E WA, AK, W USA, Rest USA, E Lower Mainland, W Lower Mainland, Rest BC, AB, W Canada, E Canada*
Destination	Truck's destination city
Destination State	State or Province of destination city
Destination Zone	Destination region *Whatcom, Pt Roberts, Puget Sound, W WA, E WA, AK, W USA, Rest USA, E Lower Mainland, W Lower Mainland, Rest BC, AB, W Canada, E Canada*
Commodity	Commodity description
Commodity Code	Two-digit SCTG code for the commodity type
Commodity Category	Generalized commodity categories used in regional model *Manufacturing, Unknown, Food, Wood, Bulk, Farm, PrintedMatters, Empty*
LTL	Marked if the truck was carrying less-than-truckload
Carrier No	Number representing the name of the trucking company
Carrier City	Carrier company's base city (as listed on the truck)
Carrier State	State or Province of the carrier company's base city
Carrier Zone	Carrier base city's region *Whatcom, Pt Roberts, Puget Sound, W WA, E WA, AK, W USA, Rest USA, E Lower Mainland, W Lower Mainland, Rest BC, AB, W Canada, E Canada*
Vehicle Type	Type of truck *Passenger vehicle, RV, Pickup Truck, Light Truck, Tractor Only, Tractor Van, Tractor Container, Tractor Flatbed, Tractor Tank, Truck, Truck with Trailer, Other*

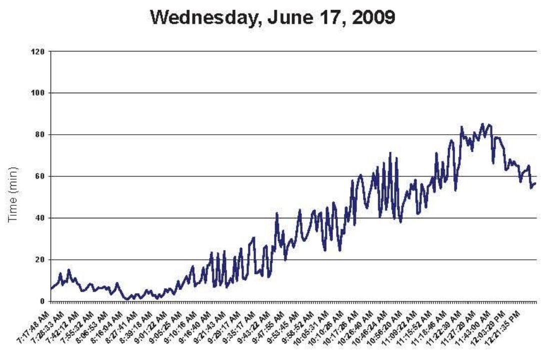
FROM BOOTH (Matched Records)	Northbound	Southbound	Total
Pacific Highway	1,457	1,522	**2,997**
Lynden/Aldergrove	245	284	**529**
Sumas/Huntingdon	414	777	**1,191**
Total	**2,134**	**2,583**	**4,714**

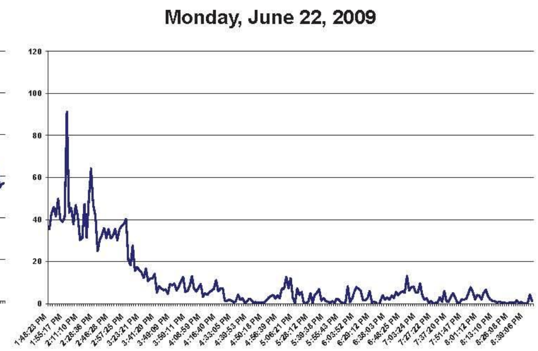
FROM BOOTH_24	Northbound	Southbound	Total
Pacific Highway	4,355	4,136	**8,491**

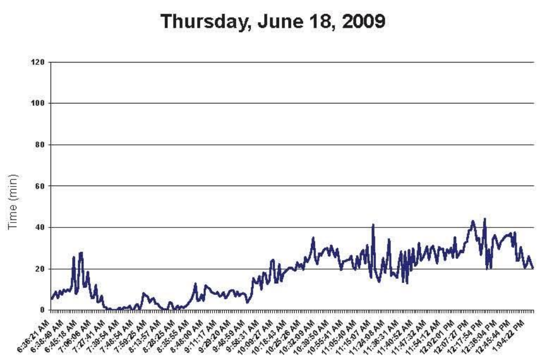
TRAVEL TIMES

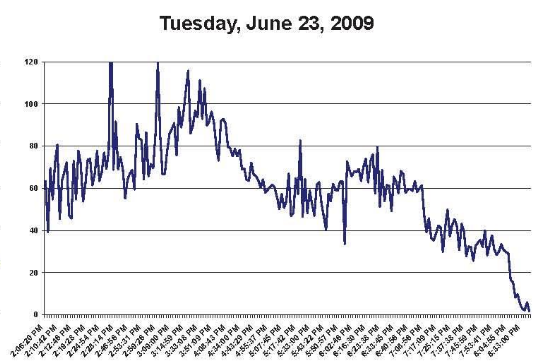
Truck Wait Times, Pacific Highway Southbound Standard Lanes

From end of queue to arrival at booth (not including booth time)

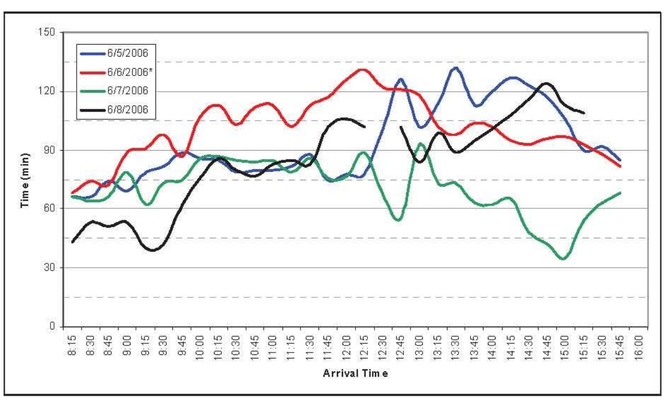








2006 Southbound Non-FAST Lanes Travel Times



** The FAST lane was open to general truck traffic during the entire day*

QUEUE & INSPECTION TIMES

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	2	69	3
	General	16	76	17

PACIFIC HIGHWAY SOUTHBOUND

8AM - 5PM weekeday

Year	Lane	Queue Time (Avg Mins)	Inspection Time (Avg Secs)	Total Time (Avg Mins)
2002	Empty/Preclea	45	NA	
	General	70	57	50
2006	FAST	20	87	21
	General	78	120	80
2009	FAST	7	76	8
	General	28	100	29

LYNDEN/ALDERGROVE 2009

8AM-5PM weekday

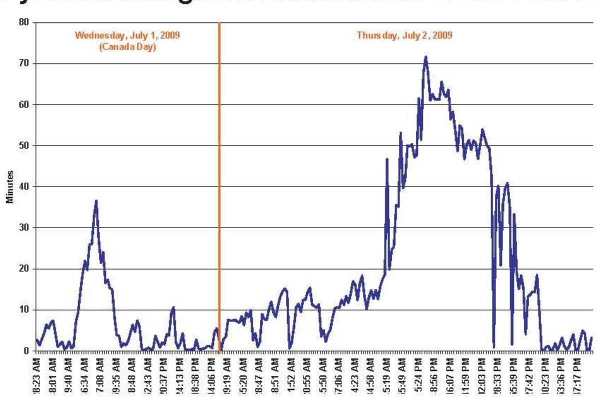
Direction	Queue Time (Avg Mins)	Inspection Time (Avg Secs)	Total Time (Avg Mins)
Northbound		351	
Southbound	18	105	19

SUMAS/HUNTINGDON 2009

8AM-5PM weekday

Direction	Queue Time (Avg Mins)	Inspection Time (Avg Secs)	Total Time (Avg Mins)
Northbound	11	140	13
Southbound	15	57	16

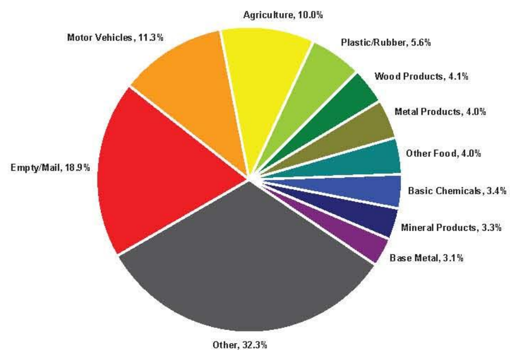
Lynden/Aldergrove Southbound Truck Wait Times



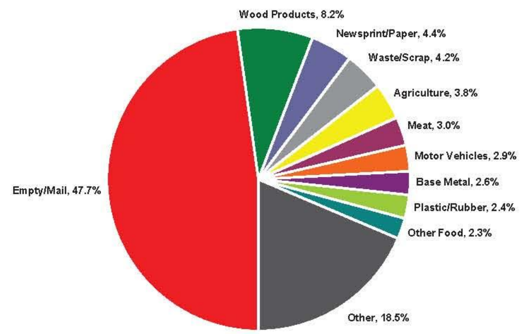
COMMODITY

Pacific Highway Booth Data

Northbound

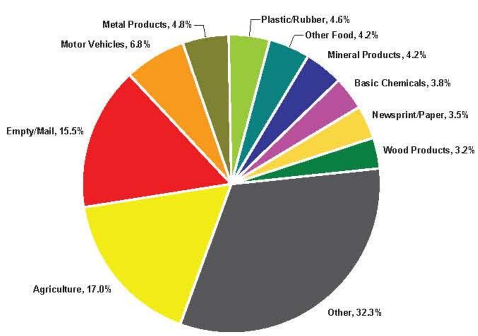


Southbound

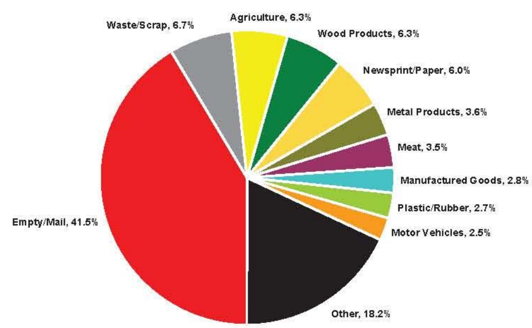


Pacific Highway 24 Hour Data

Northbound



Southbound

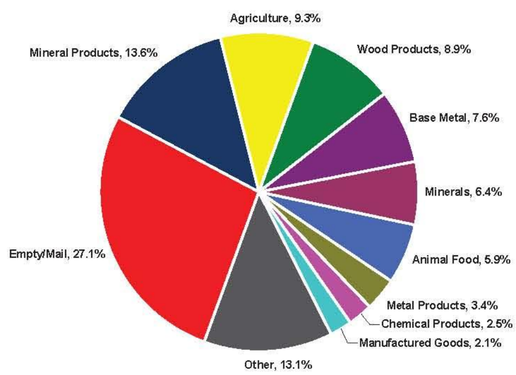


Note: These data represent truck loads, not value or weight (as are national level trade statistics).

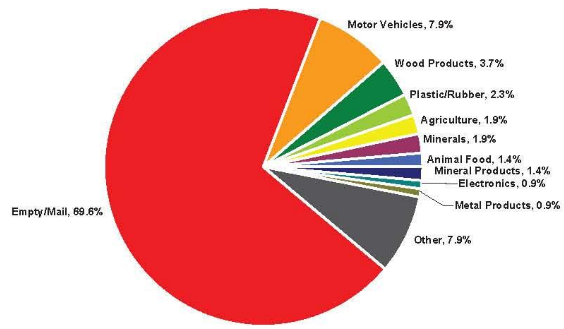
COMMODITY

Lynden/Aldergrove Booth Data

Northbound

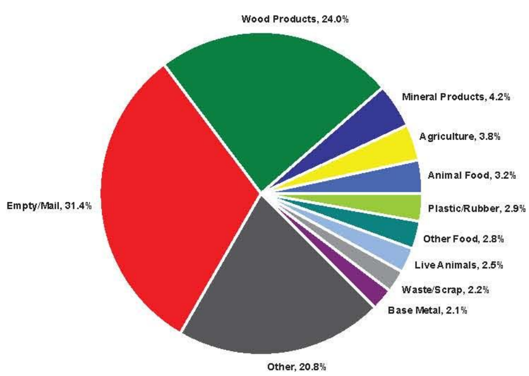


Southbound

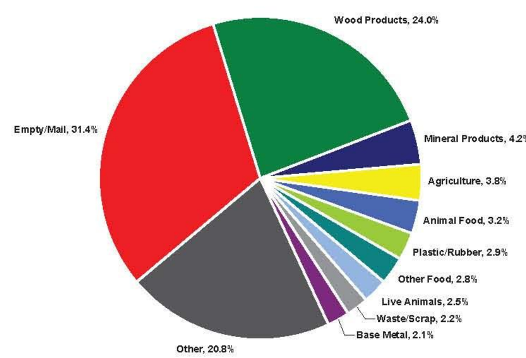


Sumas/Huntingdon Booth Data

Northbound



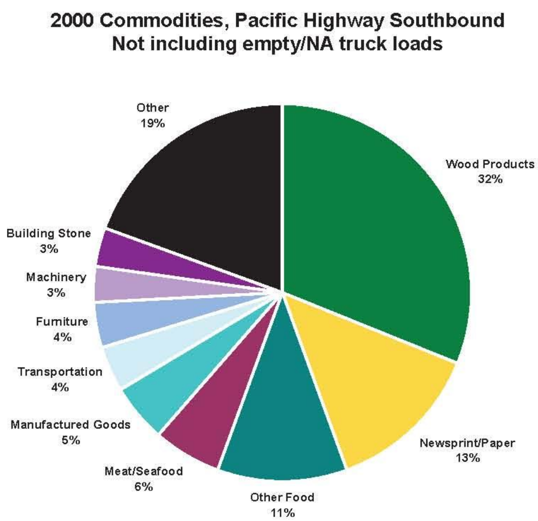
Southbound

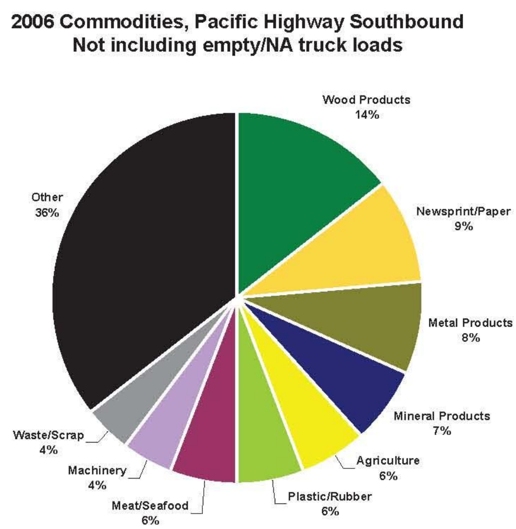


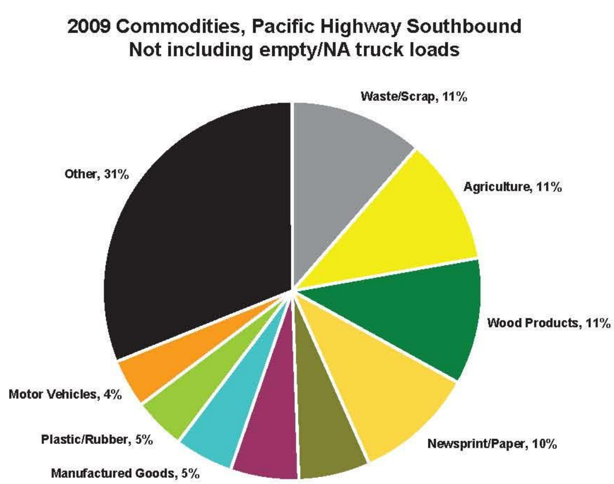
Note: These data represent truck loads, not value or weight (as are national level trade statistics).

COMMODITY

9 Year Comparison of Southbound Commodity Composition







Data Sources: 2009 IMTC CVO Survey; 2006 CVO Evaluation Study; 2000 Cross-Border Trade & Travel Study

VEHICLE TYPES

PACIFIC HIGHWAY NORTHBOUND

Vehicle Type	#	%
Tractor Van	792	51.7%
Tractor Flatbed	145	9.5%
Tractor Container	130	8.5%
Light Truck	121	7.9%
Tractor Tank	101	6.6%
Passenger Vehicle	94	6.1%
Other	32	2.1%
Pickup Truck	27	1.8%
Truck Trailer	26	1.7%
Tractor Other	24	1.6%
Tractor Only	24	1.6%
Truck	13	0.8%
RV	3	0.2%
TOTAL	**1,532**	

LYNDEN/ALDERGROVE NORTHBOUND

Vehicle Type	#	%
Tractor Flatbed	108	41.1%
Tractor Van	61	23.2%
Tractor Other	21	8.0%
Light Truck	20	7.6%
Tractor Tank	19	7.2%
Tractor Container	13	4.9%
Truck	9	3.4%
Truck Trailer	6	2.3%
Pickup Truck	3	1.1%
Passenger Vehicle	2	0.8%
Tractor Only	1	0.4%
Other	0	0.0%
RV	0	0.0%
TOTAL	**263**	

SUMAS/HUNTINGDON NORTHBOUND

Vehicle Type	#	%
Tractor Flatbed	125	28.5%
Tractor Van	104	23.7%
Tractor Other	55	12.6%
Passenger Vehicle	37	8.4%
Light Truck	34	7.8%
Tractor Tank	23	5.3%
Pickup Truck	19	4.3%
Tractor Container	16	3.7%
Truck Trailer	15	3.4%
Truck	4	0.9%
Other	4	0.9%
Tractor Only	2	0.5%
RV	0	0.0%
TOTAL	**438**	

PACIFIC HIGHWAY SOUTHBOUND

Vehicle Type	#	%
Tractor Van	895	57.5%
Tractor Flatbed	163	10.5%
Tractor Tank	125	8.0%
Light Truck	120	7.7%
Tractor Container	64	4.1%
Passenger Vehicle	63	4.0%
Pickup Truck	38	2.4%
Tractor Only	26	1.7%
Tractor Other	25	1.6%
Other	20	1.3%
Truck Trailer	13	0.8%
Truck	5	0.3%
RV	0	0.0%
TOTAL	**1,557**	

LYNDEN/ALDERGROVE SOUTHBOUND

Vehicle Type	#	%
Tractor Van	61	26.8%
RV	43	18.9%
Truck Trailer	32	14.0%
Tractor Flatbed	27	11.8%
Passenger Vehicle	27	11.8%
Light Truck	25	11.0%
Tractor Tank	19	8.3%
Pickup Truck	14	6.1%
Tractor Other	12	5.3%
Tractor Container	9	3.9%
Other	9	3.9%
Truck	6	2.6%
Tractor Only	5	2.2%
TOTAL	**228**	

SUMAS/HUNTINGDON SOUTHBOUND

Vehicle Type	#	%
Tractor Van	238	29.5%
Tractor Flatbed	236	29.2%
Tractor Other	70	8.7%
Passenger Vehicle	54	6.7%
Pickup Truck	47	5.8%
Light Truck	42	5.2%
Tractor Tank	38	4.7%
Tractor Container	25	3.1%
Truck	17	2.1%
Truck Trailer	16	2.0%
Tractor Only	13	1.6%
Other	11	1.4%
RV	0	0.0%
TOTAL	**807**	

Container traffic percentages shift noticeably by direction at Pacific Highway.

RVs are often processed through the commercial lane.

ORIGIN-DESTINATION PATTERNS

Pacific Highway Southbound Tractor Vans only

Note: Excludes all records which did not list an origin and destination, and all origin/destination pairings with less than 4 truck trips.

ORIGIN \ DESTINATION	BELLINGHAM	BLAINE	BURLINGTON	FERNDALE	FRESNO	KENT	L.A.	MT VERNON	ORTING	PT TOWNSEND	PORTLAND	RENTON	RIVERSIDE	SACRAMENTO	SEATTLE	STOCKTON	TACOMA	YAKIMA	TOTAL
BURNABY						5									9				14
DELTA	6	15	6			6		4	4						15	4	15		75
LANGLEY		6													4				10
RICHMOND		14		7		6		5				7			13		4		56
SURREY		16	5		4	13	11	5		5	14		4	5	16		17		115
VANCOUVER		18								5					11			4	38
TOTAL	6	69	11	7	4	30	11	14	4	10	14	7	4	5	68	4	36	4	308

Lynden/Aldergrove Northbound Tractor Flatbeds only

Note: Excludes all records which did not list an origin and destination, and all origin/destination pairings with less than 2 truck trips.

ORIGIN \ DESTINATION	ABBOTSFORD	LADNER	LANGLEY	PORT KELLS	RICHMOND	SURREY	VANCOUVER	TOTAL
LEBANON						2		2
LYNDEN	4	2				2		8
MONROE	5							5
MOSES LAKE						3		3
PORTLAND	2		2					4
RAINIER			4	4		8		16
SEATTLE	4		2		2	2	2	12
SPOKANE						2		2
TACOMA						2		2
WOODINVILLE			3					3
TOTAL	15	2	11	4	2	21	2	57

Origin-destination pairings available on a regional level as well, and by commodity if desired.

FAST LANE COMMODITIES

Pacific Highway Northbound

STANDARD LANES

Commodity Group	#	%
Empty/Mail	249	18.5%
Motor Vehicles	152	11.3%
Agriculture	136	10.1%
Plastic/Rubber	74	5.5%
Wood Products	56	4.2%
Metal Products	55	4.1%
Other Food	54	4.0%
Basic Chemicals	46	3.4%
Mineral Products	45	3.3%
Base Metal	41	3.0%
Manufactured Goods	40	3.0%
Paper Products	40	3.0%
Newsprint/Paper	39	2.9%
Electronics	30	2.2%
Gasoline	29	2.2%
Meat	29	2.2%
Furniture	28	2.1%
Mixed Freight	27	2.0%
Machinery	23	1.7%
Bakery	20	1.5%
Textiles	17	1.3%
Transportation	16	1.2%
Chemical Products	16	1.2%
Other	83	6.2%
TOTAL	1,345	98.0%

FAST LANE

Commodity Group	#	%
Empty/Mail	9	40.9%
Plastic/Rubber	2	9.1%
Motor Vehicles	2	9.1%
Mixed Freight	2	9.1%
Furniture	2	9.1%
Transportation	1	4.5%
Other Food	1	4.5%
Basic Chemicals	1	4.5%
Base Metal	1	4.5%
Agriculture	1	4.5%
TOTAL	22	2.0%

Pacific Highway Southbound

STANDARD LANES

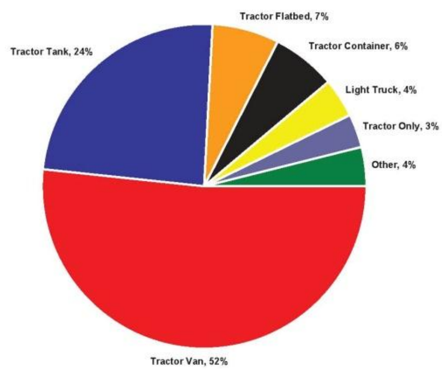
Commodity Group	#	%
Empty/Mail	448	40.4%
Wood Products	99	8.9%
Agriculture	54	4.9%
Waste/Scrap	48	4.3%
Newsprint/Paper	48	4.3%
Meat	41	3.7%
Base Metal	37	3.3%
Motor Vehicles	37	3.3%
Plastic/Rubber	31	2.8%
Manufactured Goods	29	2.6%
Other Food	27	2.4%
Paper Products	18	1.6%
Metal Products	18	1.6%
Electronics	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	77.4%

FAST LANE

Commodity Group	#	%
Empty/Mail	236	72.8%
Wood Products	19	5.9%
Newsprint/Paper	15	4.6%
Waste/Scrap	12	3.7%
Other Food	6	1.9%
Mineral Products	5	1.5%
Paper Products	4	1.2%
Motor Vehicles	4	1.2%
Other	23	7.1%
TOTAL	324	22.5%

Surveyors monitor truck arrivals at the FAST and 2nd booths at Pacific Highway southbound.

SOUTHBOUND FAST VEHICLE TYPES



FAST LANE TRUCK ORIGINS, DESTINATIONS

Pacific Highway Northbound

ORIGINS	#	%
SEATTLE	8	34.8%
KENT	2	8.7%
FERNDALE	2	8.7%
BURLINGTON	2	8.7%
BLAINE	2	8.7%
BELLINGHAM	2	8.7%
TACOMA	1	4.3%
PROSSER	1	4.3%
LYNDEN	1	4.3%
LOS ANGELES	1	4.3%
CORONA	1	4.3%
TOTAL	23	100.0%

DESTINATIONS	#	%
VANCOUVER	9	37.5%
RICHMOND	4	16.7%
SURREY	2	8.3%
LANGLEY	2	8.3%
VICTORIA	1	4.2%
PT ROBERTS	1	4.2%
DELTA	1	4.2%
COQUITLAM	1	4.2%
CLOVERDALE	1	4.2%
BURNABY	1	4.2%
ABBOTSFORD	1	4.2%
TOTAL	24	

Pacific Highway Southbound

ORIGINS	#	%
VANCOUVER	79	25.2%
DELTA	69	22.0%
SURREY	58	18.5%
RICHMOND	35	11.2%
LANGLEY	21	6.7%
BURNABY	20	6.4%
NEW WESTMINSTER	5	1.6%
VANCOUVER AIRPORT	5	1.6%
COQUITLAM	4	1.3%
ANNACIS ISLAND	3	1.0%
PITT MEADOWS	3	1.0%
MAPLE RIDGE	2	0.6%
PT ROBERTS	2	0.6%
OTHER	7	2.2%
TOTAL	313	

DESTINATIONS	#	%
BLAINE	49	15.9%
SEATTLE	41	13.3%
FERNDALE	34	11.0%
CHERRY POINT	22	7.1%
TACOMA	18	5.8%
KENT	13	4.2%
BELLINGHAM	13	4.2%
MT VERNON	12	3.9%
BURLINGTON	9	2.9%
ARLINGTON	7	2.3%
EVERETT	7	2.3%
REDMOND	7	2.3%
SUMNER	6	1.9%
OTHER	71	23.0%
TOTAL	309	

CARRIER FREQUENCY

Pacific Highway Northbound & Southbound, 24 Hour Booth Data

Total number of carrier companies observed: 1,263
Number of carriers which make up 50 percent of all observed crossings (northbound and southbound): 110

9 percent of carriers make up 50 percent of all commercial traffic at Pacific Highway.

Booth Data

Port	Direction	Total Number of Carrier Companies Observed	Number of Carriers which Make Up 50% of all Observed Crossings
Pacific Highway	Northbound	516	87
Pacific Highway	Southbound	552	81
Lynden/Aldergrove	Northbound	118	21
Lynden/Aldergrove	Southbound	102	82
Sumas/Huntingdon	Northbound	166	47
Sumas/Huntingdon	Southbound	324	126

CARRIER STATE/PROVINCIAL BASE

58 percent of carriers are based in British Columbia; 25 percent are based in Washington State, with the rest based elsewhere. The only crossing that shows a higher Washington State base than B.C. is southbound at Lynden/Aldergrove, where 45 percent of carriers are from WA State and 37 percent from B.C. *(Note: Surveying at Lynden/Aldergrove southbound included Canada Day, which may have affected the numbers of Canadian trucking companies working on the holiday).*

Carrier names and cities of origin were collected from the sides of tractor vehicles. Southbound at Sumas, surveyors collected this information separately due to booth visibility restrictions.

ONLINE DISPATCHER SURVEY

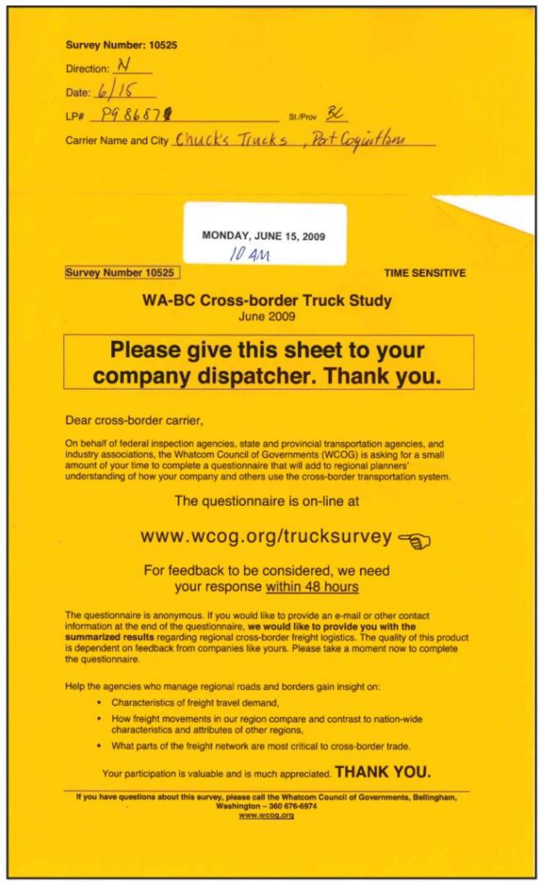
1,797 survey flyers were distributed to truck drivers at Pacific Highway northbound and southbound ports-of-entry between June 15 and June 25, 2009.

188 surveys were completed online (218 surveys were started), a **10 percent** response rate. The resulting database has 211 records, of which all but 41 are linked directly to the main survey. A separate final report is available for this survey, written by the University of Washington.

Surveyors handed flyers to truck drivers and asked them to give the forms to their dispatchers.

Survey Questions

- Survey number (to tie into carrier name, license plate, date, and port written on slip, and to link to main database)
- Carrier Name
- Facility the truck is based at
- Did the truck make multiple border crossings this day?
- Where did the truck start its day?
- At what kind of facility did it start?
- How many stops did the truck make before crossing the border?
- What city was the load picked up in?
- At what type of facility was the load picked up?
- Description of freight picked up
- (Questions repeated for additional loads)
- (Questions for trucks crossing empty)
- How many deliveries made?
- Delivery location(s) and type(s)
- Delivery load time window
- Penalty if missed time window?
- What happened after deliveries completed?
- Backhaul picked up? Location, description, and destination
- Who is enrolled in FAST? (i.e. driver, carrier, shipper, U.S. program, Cdn program, etc.)
- Did the truck use the northbound FAST lane?
- Did the truck use the southbound FAST lane?
- How many minutes does your company/driver typically plan to wait at the border?
- What is more important to you for cross-border wait times, predictability or speed?
- What do you consider a predictable amount of border wait time?
- Optional contact information/e-mail



Survey Number: 10525
Direction: N
Date: 6/15
LP# P9 8687 St./Prov BC
Carrier Name and City Chuck's Trucks, Port Coquitlam

MONDAY, JUNE 15, 2009
10 AM

Survey Number 10525 TIME SENSITIVE

WA-BC Cross-border Truck Study
June 2009

Please give this sheet to your company dispatcher. Thank you.

Dear cross-border carrier,

On behalf of federal inspection agencies, state and provincial transportation agencies, and industry associations, the Whatcom Council of Governments (WCOG) is asking for a small amount of your time to complete a questionnaire that will add to regional planners' understanding of how your company and others use the cross-border transportation system.

The questionnaire is on-line at

www.wcog.org/trucksurvey

For feedback to be considered, we need your response within 48 hours

The questionnaire is anonymous. If you would like to provide an e-mail or other contact information at the end of the questionnaire, **we would like to provide you with the summarized results** regarding regional cross-border freight logistics. The quality of this product is dependent on feedback from companies like yours. Please take a moment now to complete the questionnaire.

Help the agencies who manage regional roads and borders gain insight on:

- Characteristics of freight travel demand,
- How freight movements in our region compare and contrast to nation-wide characteristics and attributes of other regions,
- What parts of the freight network are most critical to cross-border trade.

Your participation is valuable and is much appreciated. **THANK YOU.**

If you have questions about this survey, please call the Whatcom Council of Governments, Bellingham, Washington – 360 676-6974
www.wcog.org

Copy of flyer distributed to truck drivers as they exited the port-of-entry. Top portion of flyer was ripped off and entered into the database at WCOG.

BUS SURVEY

Survey dates northbound: Saturday July 4, 9am-2pm; Friday July 10, 9am-3pm
Survey dates southbound: Friday July 3. 9am-2pm; Saturday July 11, 9am-3pm
Buses observed northbound: 27 **Passengers interviewed northbound**: 95
Buses observed southbound: 57 **Passengers interviewed southbound**: 203

Data Fields

Bus Number	Number for each individual bus, linking to passenger data
State/Prov	License plate state or province
Carrier	Name of bus company
Carrier City	City listed on side of bus for carrier company
Carrier State	State or Province listed for the carrier company city
Vehicle Type	Type of vehicle *Bus, Shuttle, Van, Limo, RV*
Luggage Off?	Marked if passengers unloaded their luggage for inspection
Passengers Off?	Marked if passengers disembarked the vehicle
Date	Date of survey
Direction	Direction of travel *Northbound, Southbound*
Queue End	Timestamp of vehicle's arrival at the end of the queue, or at the facility itself if no queue
Inspection Arrival	Timestamp when the driver began the inspection process
Inspection Departure	Timestamp when the vehicle left the inspection area
Staging Full	Marked when the staging area was full of buses and the bus was waiting in line to enter the bus area
Last Passenger Off	Timestamp of the last passenger leaving the bus
No. Passengers	Number of passengers, as provided by the bus driver
Capacity	Number of seats in the vehicle
Last Stop	Location of the most recent bus stop
Next Stop	Location of the next bus stop
All Off	Marked if all passengers getting off at the next stop
Pickups	Marked if the bus plans on picking up additional passengers before the last stop
Farthest Destination	Last destination of the bus trip
Border Trips	Marked if the bus will be making another cross-border trip that day
No. Trips	Number of additional cross-border trips to be made (if answered yes to the above question)
Carrier Type	Type of service *Charter, Common Carrier, Private, Other*
Inspection Counters	How many (maximum) inspection counters were open during inspection
Last Passenger On	Timestamp of the last passenger getting on the bus to depart the facility

Inspection Times

Direction	Average Duration at the Port	Longest Time	Shortest Time	# Buses Unloaded	# Buses Pre-cleared
Northbound	28 min, 35 sec	1 hr, 25 min	3 min	10	17
Southbound	28 min, 3 sec	1 hr., 29 min	1 min	35	22

Carriers

Direction	# Carriers	# Charters	# Common Carriers	# Private/Other
Northbound	9	11	9	3
Southbound	19	33	16	2

NEXUS SURVEYING

This survey effort solicited feedback from passenger travelers at the Lynden/Aldergrove and Sumas/Huntingdon ports-of-entry. The information gathered can be used to gauge awareness of the NEXUS program, interest in the program, and basic parameters around eligibility and marketability.

Schedule

Port	Day	# Records
Lynden/Aldergrove	Mon, July 20	122
Sumas/Huntingdon	Tue, July 21	175
Lynden/Aldergrove	Wed, July 22	133
Sumas/Huntingdon	Thu, July 23	106
Lynden/Aldergrove	Fri, July 4	37
	TOTAL	**573**

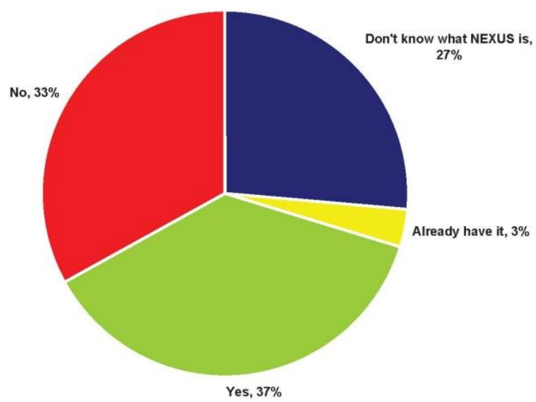
NEXUS familiarity

Are you familiar with the NEXUS program?

	Lynden		Sumas	
	#	%	#	%
No	78	27.4%	78	28.7%
Yes	207	72.6%	194	71.3%
Total	**285**		**272**	

Would you get NEXUS if it were at this port-of-entry?

Lynden/Aldergrove & Sumas/Huntingdon responses combined as they were nearly identical.



Surveyors interview southbound drivers at the Lynden/Aldergrove port-of-entry about NEXUS.

NEXUS Quiz

If drivers indicated they were familiar with NEXUS, but did not have a NEXUS card themselves, they were asked about four attributes of the program.

Do you know it costs $50?

Do you know it's good for 5 years?

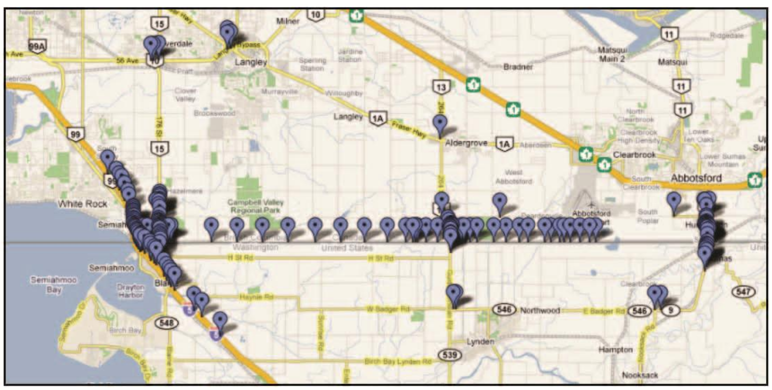
Do you know kids are free?

Do you know it's good for new US ID reqs?

CASCADE GATEWAY SIGNAGE INVENTORY

The signage inventory project was undertaken to a) identify gaps in signage between crossings and where improvements need to be made to better direct to and between each crossing; b) understand signage appearance discrepancies between U.S. and Canada and between agencies and support recommendations for future designs; and c) suggest message clarification on signs that have outdated wording or messages to improve traveler understanding.

- Data collection completed July 21-23 by a team of 4 BPRI student researchers
- Day 1: East-west connecting roads in WA plus Lynden/Aldergrove & Sumas/Huntingdon ports
- Day 2: East-west connecting roads in BC plus Peace Arch port
- Day 3: North-south connecting roads and Pacific Highway port
- All border-related signs photographed and maked with GPS location device
- Sign images linked to Google Map using GPS coordinates
- Online map and photos is on the project website at www.wcog.org/imtc



Online map shows where border-related signs are located. Clicking on a link shows a picture and the coordinates of each sign.

Collection showing the various signs facing travelers as they approach a port-of-entry.

OTHER PRODUCTS AVAILABLE UPON REQUEST

Material from the 2009 IMTC Commercial Vehicle Operations Survey include:

- Final project database
- Database documentation
- Bus database
- Nearborder operations and logistical inefficiencies: an analysis of 2009 CVO survey data - Report from University of Washington
- NEXUS survey database
- NEXUS survey final report
- Online signage inventory
- Peace Arch anti-idling zone survey report
- Border Policy Research Institute policy briefs
- 2006 and 2003 CVO Evaluation survey reports

For these and other materials, contact the Whatcom Council of Governments at (360) 676-6974 or visit the project website online at: www.wcog.org.

Surveyors collected bus passenger and bus processing data at Pacific Highway.