Washington State Rail Plan

Technical Note 3a: Freight Rail Demand, Commodity Flows, and Volumes

Final Report

prepared for

Washington State Department of Transportation (WSDOT)

prepared by

Cambridge Systematics, Inc.
Washington State Rail Plan

Technical Note 3a: Freight Rail Demand, Commodity Flows, and Volumes

prepared for
Washington State Department of Transportation (WSDOT)

prepared by
Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA  94607

date
August 2013
# Table of Contents

Key Findings ........................................................................................................................................ 1

1.0 Introduction ................................................................................................................................. 1-1

2.0 Market Factors Driving Freight Demand ...................................................................................... 2-1
   2.1 Industries that Use Rail ............................................................................................................. 2-1
   2.2 The Importance of International Trade .................................................................................... 2-4
   2.3 Other Global and Economic Trends ........................................................................................ 2-6

3.0 Commodity Flow Profile .............................................................................................................. 3-1
   3.1 Statewide Rail Commodity Flows ............................................................................................ 3-1
   3.2 Rail Carrier Splits ................................................................................................................... 3-4
   3.3 Rail Service Composition ........................................................................................................ 3-8
   3.4 Trade Partners ....................................................................................................................... 3-12
   3.5 Commodities Moved by Rail .................................................................................................... 3-13

4.0 Train Volumes .............................................................................................................................. 4-1

A. Appendix ........................................................................................................................................ A-1
   A.1 Other Demand Drivers for Freight Rail Usage in Washington .............................................. A-1
   A.3 Commodity Flows Data Sources ............................................................................................. A-9
   A.4 Data and Methodology for Determining Traffic (Train Service Type) Mix by Rail Segment ......................................................................................................................................... A-11
List of Tables

Table 2.1  List of Freight Intensive and Service Industry Types .................. 2-2
Table 2.2  Annualized Growth in Freight Intensive Industries .................. 2-4
Table 2.3  Total Waterborne Trade at Washington Ports ......................... 2-5
Table 2.4  2011 International Trade with Washington Summary .................. 2-6
Table 3.1  Commodities and Volumesa Handled by Short-Line Railroads in Washington ................................................................. 3-5
Table 3.2  Annual Rail Flows by Service Type at Port Locations in Washington Based on Washington’s 2009 Marine Cargo Forecast Report, 2007 and 2010 ......................................................... 3-11
Table 3.3  Regions in Washington .......................................................... 3-13
Table A.1  Shipments Originating in Washington by Mode, 2007................. A-5
List of Figures

Figure 1. Annual Rail Flows by Trading Partner, 2010................................................. 4
Figure 2. Average Known and Estimated Daily Freight Train Volumes, 2010 .................................................................................................................. 6
Figure 2.1 2010 Employment by NAICS Industry Sector in Washington State .........................................................................................................................2-2
Figure 2.2 2010 Real GDP Contribution by NAICS Industry Sector in Washington State ........................................................................................................2-3
Figure 3.1 Annual Rail Flows in Washington by Direction of Movement, 2010 .........................................................................................................................3-2
Figure 3.2 Annual Rail Flows in Washington, 2007..................................................... 3-3
Figure 3.3 Annual Rail Flows in Washington by Rail Carrier, 2010.......................... 3-4
Figure 3.4 Short-Line Railroads in Washington .......................................................... 3-7
Figure 3.5 Annual Rail Flows in Washington by Service Type, 2010.......................... 3-9
Figure 3.6 Average Tons per Carload by Service Type for Rail Flows in Washington, 2010 .......................................................................................................3-10
Figure 3.7 Annual Rail Flows by Trade Partner in Washington, 2010...................... 3-12
Figure 3.8 Top Commodities Moved Inbound by Rail in Washington, 2010...... 3-14
Figure 3.9 Top Commodities Moved Outbound by Rail in Washington, 2010 ....... 3-16
Figure 3.10 Top Commodities Among Intrastate Annual Rail Flows in Washington, 2010........................................................................................................3-18
Figure 4.1 Average Known and Estimated Daily Freight Train Volumes,a 2010 .........................................................................................................................4-3
Figure A.1 Trends in Fuel Prices, Gasoline and Crude Oil Prices, January 2008 to January 2013 ............................................................................................................ A-3
Key Findings

Technical Note 3a: Freight Rail Demand, Commodity Flows and Volumes summarizes the 2010 conditions on Washington’s freight rail system. It builds off the findings from Technical Note 2: Freight and Passenger Rail Inventory, and is one of two technical notes discussing current-year demand on the state’s rail system (along with Technical Note 3b: Passenger Rail Usage and Impacts of the Rail System in Washington State). The first part of this technical note is a brief summary of some of the market factors that drive the demand for freight rail, including population, income and industry health. Next, the 2010 commodity flow profile is presented, including a description of projected inbound and outbound key commodities and volumes. Finally, a 2010 snapshot of freight train volumes is presented, which shows the average number of freight trains moving on the state’s system in 2010.

Some of the key findings from this freight, commodity and volumes analysis include:

Freight Rail Demand Drivers

• Demand for freight rail is influenced by the size and presence of a large customer base in the form of freight intensive industries, such as manufacturing, construction, retail and wholesale trade, and agriculture. In Washington, these industries employ more than 1.2 million people, or 40 percent of the state’s total employment. In terms of contribution to the Gross Domestic Product (GDP), freight intensive industries provided about 41 percent of the state’s total GDP in 2010, or about $106 billion. Manufacturing was responsible for about $36 billion of this, retail trade about $23 billion and wholesale trade about $16 billion.

• Another important driver of freight rail demand in Washington is international trade. International trade is vital to the state’s economy—in fact, it has been estimated that export-supported jobs linked to manufacturing account for an estimated 8.6 percent of Washington’s total private-sector employment.1 Two important links in this international trade system are the state’s largest ports, the Ports of Seattle and Tacoma. Combined, these ports imported/exported $60 billion of goods in 2009, making them the third largest container load center in the nation.2 Several other deep-water ports throughout the state participate in international trade, including Bellingham, Everett, Grays Harbor, Olympia, Vancouver (WA), and the international land

---

port at Blaine. These ports, in coordination with the surface transportation system (including freight rail and a robust highway network), comprise a seamless network that connects Washington industries to global markets, and imports goods to support industries and residents in Washington.

**Freight Rail Commodity Flow Characteristics**

- In 2010 the rail system in Washington handled about 116 million tons of cargo.\(^3\) About 50 percent of these flows (roughly 60 million tons) were inbound to the state of Washington, compared to only 16 percent (roughly 19 million tons) outbound from the state. Almost 29 percent were through movements, meaning that the shipments neither originated nor terminated within the state.

- The majority of the non-through rail flows (that is, rail flows originating or terminating in Washington, about 81.9 million tons) were domestic (61 percent, or about 50 million tons)—including domestic inbound flows (29 million tons); domestic intrastate flows (8 million tons); and domestic outbound flows (13 million tons). International flows account for about 39 percent of total rail tonnage.\(^4\) Tonnage per carload and per train varies depending on the type of commodities carried. For example, the average intermodal container or trailer load weighs only 13 tons, compared with about 120 tons for bulk coal. Figure 2 (see page 6) suggests how these tonnage values translate into train volumes per day.

- There are four main rail service types\(^5\) within Washington. Understanding these service types helps to link train volumes to specific demand drivers, as well as to total commodity volumes shipped by rail throughout the state:
  1. The **bulk service type** includes unpackaged grain, coal and other dry and liquid bulk. This accounts for 60 million tons (51 percent) of total statewide rail volume.
  2. **Intermodal service type** consists of commodities moving in containers or truck trailers on flat cars or specialized intermodal cars. This traffic accounts for 16.6 million tons (14 percent) of the total commodity flows.

---

\(^3\) This is almost the same amount as noted in 2007 of 116 million tons in the 2009 *Washington State 2010 – 2030 Freight Rail Plan*, which used the 2007 Surface Transportation Board (STB) Carload Waybill Sample Data.

\(^4\) Federal Highway Administration Freight Analysis Framework Version 3.3 (FAF3.3) Commodity Flows Database, FAF3.3 Data.

3. **Auto service type** includes assembled automobiles, vans and trucks moving in multilevel cars. This service type accounts for 1 million tons (less than 1 percent) of total statewide tonnage.\(^6\)

4. The **general merchandise service type** includes all volumes not captured in the other three service types. This accounts for 40 million tons (34 percent) of total statewide rail tonnage.

It should be noted that higher volume does not necessarily translate into more traffic. In fact, bulk and general merchandise service types carry more tons per unit than the intermodal and auto service types. For example, intermodal generally carries a maximum of 20 tons per unit, compared to a maximum of 100 to 120 tons per carload for bulk trains. This is an important concept, since it means that higher tonnage volumes do not always equate to more carload traffic. In fact, in terms of carload equivalents of traffic, intermodal service type makes up a majority (55 percent) of the total carloads for commodity flows in Washington, followed by general merchandise, bulk-other, bulk-coal and auto service types; each accounting for 19 percent, 17 percent, 7 percent and 2 percent of the total carloads, respectively.

- As shown in Figure 1, the dominant rail trading partners with Washington on a tonnage basis include the following U.S. regions:
  - **West North Central region**, which includes North and South Dakota, Nebraska, Kansas, Minnesota, Iowa and Missouri: 37 million tons (45 percent).
  - **Mountain region**, which includes Montana, Idaho, Nevada, Utah, Colorado, Wyoming, Arizona and New Mexico: 15 million tons (18 percent).
  - **East North Central region**, which includes Wisconsin, Michigan, Illinois, Ohio and Indiana: 11.6 million tons (14 percent).

\(^6\) This designation does not include automobile parts or components, but instead finished, assembled vehicles.
Freight Rail Train Volumes

- Estimated typical daily freight train volumes from 2010 are shown in Figure 2. These volumes, which can fluctuate considerably, were drawn from a combination of train count data provided by the Class I railroads and the STB Carload Waybill Sample. As of 2010 BNSF Railway Company’s (BNSF) Spokane-Sandpoint, Idaho corridor had the highest train volumes in the state, carrying 48 daily trains.\(^7\) BNSF’s Auburn-Pasco corridor over Stampede Pass had the least amount of freight rail traffic, carrying only two daily trains. However, operational changes undertaken by BNSF in mid-2012 have led to increased train volumes (from two to six) over Stampede Pass, an increase that is included in Figure 2.

- The Seattle-Portland corridor has the highest volume of passenger rail traffic (18 Sounder commuter, eight Amtrak Cascades intercity, and two Coast Starlight long-distance trains). These trains share the track with up to 31 daily freight trains\(^8\) and considerable local switching activity. Most of this route

---

\(^7\) Does not include the short segment in the Spokane vicinity, Sunset Junction-Spokane.

\(^8\) BNSF 2010 Train Counts Data for State of Washington.
Consists of two main tracks that are equipped with bi-directional signals and centralized traffic control.

- Almost 94 percent of the state’s east-west bulk cargo rail traffic, a majority of which is traveling westbound, uses the Spokane-Pasco-Vancouver-Puget Sound route (about 550 miles). This more circuitous route between Spokane and Puget Sound is used instead of the more direct routes over Stevens Pass (about 325 miles) and Stampede Pass (about 400 miles) because of the steep grades and tunnel-related capacity constraints located on Stevens Pass and Stampede Pass.
Figure 2.  Average Known and Estimated Daily Train Volumes, 2010

1.0 Introduction

The transportation of goods by themselves does not produce any value. It creates value by bringing finished product to market, carrying raw materials to industries, or otherwise moving goods from areas of supply to areas of demand. Understanding the demand for the transportation of freight by rail can lead to a deeper understanding of the role that freight rail plays in the state’s economy. For one, quantifying the demand drivers of rail—including employment and Gross Domestic Product created by the industries that generate freight rail demand—helps to demonstrate the relevance of rail to the state’s economy. Second, understanding specific bottlenecks or issues that are impacting key industries can associate potential improvements to economic development goals.

Many different factors create demand for freight rail service. These include Washington’s 7 million residents, 911 deep-water ports (including the Ports of Seattle and Tacoma) that serve as gateways to global markets, a thriving business and industrial economy, and business decisions made by the state’s two Class I railroads and numerous short-line railroads. This report does not attempt to capture every decision or demand driver. However, it does discuss some of the key drivers of freight rail service, including industrial business activity and the presence of international gateways.

This document is the first of two technical notes produced for the Washington State Rail Plan that discusses commodity movements, demand drivers and the impacts to rail volumes. This technical note focuses on current conditions, including current demand drivers, commodity flow characteristics and train volumes. Technical Note 4a, a subsequent technical note, will present future projections. Together, the current and future analyses will help to facilitate an understanding of the main users of, and importance of, the state’s freight rail system.

This report includes the following sections:

- **Section 2.0 Market Factors Driving Freight Demand.** This section presents market factors that help to create and drive the demand for freight rail.

- **Section 3.0 Commodity Flow Profile.** This section explores the existing freight rail commodity flow profile and rail service types.

- **Section 4.0 Train Volumes.** This section highlights the train volumes that currently travel over the state’s rail system.

---

The source of data for much of the discussion in this report is the U.S. Department of Transportation’s Surface Transportation Board confidential Carload Waybill Sample, a stratified sample of carload waybills for all U.S. rail traffic submitted by those rail carriers terminating 4,500 or more revenue carloads annually. More information about the Waybill Sample is available in Appendix A.3.
2.0 Market Factors Driving Freight Demand

2.1 INDUSTRIES THAT USE RAIL

Freight intensive industries rely heavily on the transportation of goods as a key part of their business model. For example, they may require daily shipments of raw materials to support a manufacturing process, or rely on the delivery of their refined or finished product to market. This group includes industries such as agriculture, manufacturing, wholesale (and retail) trade, construction, transportation and warehousing, utility and mining sectors. Because these industries are the largest generators of demand for Washington’s freight rail system, they will be the focus of analysis in this technical note.

By way of contrast to freight intensive industries, service industries are not dependent on the movement of large volumes of raw or manufactured materials. Their freight needs are far smaller in volume and more irregular, as they rely on the shipment of materials, office products and other small shipments of goods and supplies to support their ongoing operations. This category includes government, education, health care and other professional categories. These categories dominate diversified economies such as Washington’s, and are included in this discussion to provide context to the freight rail analysis.

A summary of freight intensive and service industries is provided in Table 2.1.\textsuperscript{10} As shown in Figure 2.1, freight intensive industries employ more than 1.2 million people in Washington, or 40 percent of the state’s total employment. With approximately 380,000 people, retail trade is the largest employer among the freight intensive industries in the state. This is followed by manufacturing and construction, which employ 275,000 and almost 200,000 people, respectively.

\textsuperscript{10} The 2007 North American Industry Classification System (NAICS) definitions of these industry sectors are provided in Appendix A.2.
Table 2.1 List of Freight Intensive and Service Industry Types

<table>
<thead>
<tr>
<th>Freight Intensive Industry Types</th>
<th>Service Industry Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, Forestry, Fishing and Hunting</td>
<td>Government</td>
</tr>
<tr>
<td>Mining, Quarrying, and Oil and Gas Extraction</td>
<td>Education</td>
</tr>
<tr>
<td>Utilities</td>
<td>Health Care</td>
</tr>
<tr>
<td>Construction</td>
<td>Insurance</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Financial Services and Banking</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>Real Estate and Rental Services</td>
</tr>
<tr>
<td>Retail Trade</td>
<td></td>
</tr>
<tr>
<td>Transportation and Warehousing</td>
<td></td>
</tr>
<tr>
<td>Waste Management and Remediation Services</td>
<td></td>
</tr>
</tbody>
</table>


Figure 2.1 2010 Employment by NAICS Industry Sector in Washington State
In Thousands

Source: Bureau of Economic Analysis, U.S. Department of Commerce.

Contribution to Gross Domestic Product (GDP) closely tracks the proportion of employment by sector, with freight intensive industries providing approximately 41 percent of the state’s total GDP in 2010—or about $106 billion. Manufacturing was responsible for about $36 billion, retail trade about $23 billion, and wholesale trade about $16 billion. This is shown in Figure 2.2.
A closer look at the economic performance of freight intensive industries shows a modest rebound in 2010-2011 from the recession that began in December 2007. The annualized growth in various economic indicators over the period 2006 to 2011 for the freight intensive industries is shown in Table 2.2. This shows that, across all freight intensive industries in Washington, earnings have returned to the 2007 level for the state of Washington, which is slightly above those of the United States as a whole.

Since the earnings for the freight intensive industries are mainly dependent on the sale of goods and freight intensive services, this trend is indicative of the trend in overall trade volumes. It suggests that demand for freight rail service from these industries is stable, and even growing. More discussion of projected industry growth will be included in Technical Note 4a of this plan.
### Table 2.2 Annualized Growth in Freight Intensive Industries

<table>
<thead>
<tr>
<th>Industry</th>
<th>2011</th>
<th>Earnings</th>
<th>Employment</th>
<th>Real GDP Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight Intensive Industries in State of Washington</td>
<td>$75.4 billion</td>
<td>1.18 million</td>
<td>$107 billion</td>
<td></td>
</tr>
<tr>
<td>Earned</td>
<td>2011</td>
<td>5.1%</td>
<td>0.9%</td>
<td>-6.8%</td>
</tr>
<tr>
<td>Employment</td>
<td>0.9%</td>
<td>-1.3%</td>
<td>-7.5%</td>
<td>-3.4%</td>
</tr>
<tr>
<td>Real GDP Contribution</td>
<td>0%</td>
<td>-2.4%</td>
<td>-6.1%</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

| Freight intensive Industries in U.S. | $3,160.1 billion | 53.92 million | $4,657.6 billion |
| Earned | 2011 | 2.1% | 0.8% | -10.1% | 2.4% | 5.7% | 0.0% |
| Employment | 0.6% | -2.4% | -7.3% | -2.2% | 1.1% | -2.1% |
| Real GDP Contribution | 1.7% | -3.5% | -7.9% | 6.1% | 1.4% | -0.6% |

Source: Bureau of Economic Analysis, U.S. Department of Commerce.

a Includes earnings from farming.

#### 2.2 THE IMPORTANCE OF INTERNATIONAL TRADE

International trade is of particular importance to Washington state. According to the Office of Trade and Industry Information, export-supported jobs linked to manufacturing account for an estimated 8.6 percent of Washington’s total private-sector employment.\(^{11}\) In addition, it is estimated that “two-fifths (40.2 percent) of all manufacturing workers in Washington depend on exports for their jobs.”\(^{12}\) The strong export orientation is driven primarily by Washington’s high technology and aviation sectors.

Two vital links in this international trade system are the Ports of Seattle and Tacoma, which together comprise the third largest container load center in the nation (behind the Ports of Los Angeles/Long Beach and New York/New Jersey).\(^{13}\) Combined, these two ports imported and exported goods worth almost $60 billion in 2009 (Table 2.3). For both the Ports of Seattle and Tacoma, the dollar value of their exported goods (which total $46 billion) is greater than the dollar value of imported goods (which total $14 billion). Blaine, an international land port, has a combined import/export value of almost $15 billion; and the Seattle-Tacoma International Airport (Sea-Tac) has a combined import/export value of $12 billion.

---


\(^{12}\) Ibid.

Several other deep-water ports are located in Washington, including Everett in the Puget Sound and Vancouver, Washington, on the Columbia River. Table 2.3 provides a summary of total international trade (including international trade with Washington) at some of Washington’s largest ports, from 2006 to 2010.

### Table 2.3  Total Waterborne Trade at Washington Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seattle</td>
<td>37,386</td>
<td>40,712</td>
<td>40,442</td>
<td>33,880</td>
<td>43,147</td>
</tr>
<tr>
<td>Tacoma</td>
<td>31,909</td>
<td>32,833</td>
<td>35,355</td>
<td>25,268</td>
<td>27,946</td>
</tr>
<tr>
<td>Sea-Tac Airport</td>
<td>19,859</td>
<td>22,588</td>
<td>19,689</td>
<td>18,556</td>
<td>20,243</td>
</tr>
<tr>
<td>Blaine</td>
<td>19,653</td>
<td>21,150</td>
<td>21,966</td>
<td>17,926</td>
<td>19,793</td>
</tr>
<tr>
<td>Everett</td>
<td>13,322</td>
<td>13,933</td>
<td>10,678</td>
<td>13,067</td>
<td>11,157</td>
</tr>
<tr>
<td>Bellingham</td>
<td>2,851</td>
<td>2,802</td>
<td>4,254</td>
<td>2,622</td>
<td>3,803</td>
</tr>
<tr>
<td>Kalama</td>
<td>1,530</td>
<td>2,257</td>
<td>4,446</td>
<td>2,625</td>
<td>3,670</td>
</tr>
<tr>
<td>Vancouver, WA</td>
<td>2,320</td>
<td>3,210</td>
<td>3,798</td>
<td>2,971</td>
<td>3,222</td>
</tr>
<tr>
<td>Anacortes</td>
<td>2,711</td>
<td>2,947</td>
<td>4,569</td>
<td>3,008</td>
<td>3,170</td>
</tr>
<tr>
<td>Sumas</td>
<td>2,832</td>
<td>2,706</td>
<td>2,763</td>
<td>2,043</td>
<td>2,564</td>
</tr>
<tr>
<td>Port Townsend</td>
<td>1,630</td>
<td>1,684</td>
<td>2,199</td>
<td>1,101</td>
<td>1,328</td>
</tr>
<tr>
<td>Longview</td>
<td>834</td>
<td>277</td>
<td>456</td>
<td>346</td>
<td>1,045</td>
</tr>
<tr>
<td>Aberdeen/Hoquiam</td>
<td>136</td>
<td>277</td>
<td>456</td>
<td>346</td>
<td>1,045</td>
</tr>
<tr>
<td>Oroville</td>
<td>728</td>
<td>767</td>
<td>690</td>
<td>486</td>
<td>612</td>
</tr>
<tr>
<td>Boundary</td>
<td>280</td>
<td>387</td>
<td>485</td>
<td>302</td>
<td>449</td>
</tr>
<tr>
<td>Lynden</td>
<td>383</td>
<td>461</td>
<td>537</td>
<td>419</td>
<td>365</td>
</tr>
</tbody>
</table>


Table 2.4 shows a summary of the trade with Washington to the neighboring North American Free Trade Agreement countries of Canada and Mexico and the rest of the world. International trade with Washington has a mix of 42:58 between imports and exports, respectively. This means that, combined, the ports export more than they import. Almost one-third of the imports to Washington are imported from Canada, the single largest trading partner with the United States. The other two-thirds of imports arrive from countries, such as China and India, via ocean vessel. Oil and gas currently make up a majority of the imports, comprising 56 percent of imports according to value in 2011. The remaining top commodities consist of motorized vehicles and parts, electrical appliances, computers and electronics, and miscellaneous manufactured products. These are generally bound for retail trade stores and wholesale trade establishments.
### Table 2.4 2011 International Trade with Washington Summary

<table>
<thead>
<tr>
<th>Trade Type</th>
<th>Trade Partner</th>
<th>2011 Total Trade (In Millions of Current Dollars)</th>
<th>Top 2011 Commodities by Trade Value (Percent Contribution to Total Trade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA Imports</td>
<td>Canada</td>
<td>14,081</td>
<td>Oil and Gas (56%)</td>
</tr>
<tr>
<td></td>
<td>Mexico</td>
<td>500</td>
<td>Transportation Equipment (51%), Electrical Equipment, Appliances and Components (11%)</td>
</tr>
<tr>
<td></td>
<td>Rest of the World</td>
<td>32,104</td>
<td>Transportation Equipment (24%), Computer and Electronic Products (15%), Oil and Gas (12%), Miscellaneous Manufactured Commodities (11%)</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>46,685</td>
<td></td>
</tr>
<tr>
<td>WA Exports</td>
<td>Canada</td>
<td>8,547</td>
<td>Petroleum and Coal Products (23%), Transportation Equipment (11%)</td>
</tr>
<tr>
<td></td>
<td>Mexico</td>
<td>1,372</td>
<td>Petroleum and Coal Products (32%), Food Manufacturers (17%), Agricultural Products (11%)</td>
</tr>
<tr>
<td></td>
<td>Rest of the World</td>
<td>54,848</td>
<td>Transportation Equipment (49%), Agricultural Products (19%)</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>64,767</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>111,452</td>
<td></td>
</tr>
</tbody>
</table>

Source: TradeStats Express, International Trade Administration, U.S. Department of Commerce.

Note: The commodities shown are classified by NAICS industry code, and the ones not shown in the list of top commodities make contributions of less than 10 percent to the total trade under each category.

#### 2.3 Other Global and Economic Trends

In the previous sections, two primary drivers of transportation demand—Washington’s freight intensive industries and international trade—have been described. The expected trends in the freight intensive industries and global trade are strong indicators for future demand for land-side transportation and freight rail service. However, other influences are at play that will affect future demand for freight rail, and in a less predictable fashion. These influences, which are likely to be both beneficial and damaging to future freight rail volumes, include:

- Global changes in manufacturing processes and supply chain sourcing patterns.
- The deep 2008 to 2009 economic recession and subsequent slow recovery and employment trends.
• The increasing use of transloading as a supply chain strategy, which affects port selection and land-side mode choice.
• Uncertainty regarding transportation fuel sources and fuel costs.
• Major developments, such as the potential development of new bulk commodity export facilities in the Pacific Northwest and British Columbia.

These factors are summarized in Appendix A.1 of this technical note.
3.0 Commodity Flow Profile

Almost 116 million tons of goods were moved by rail through Washington in 2010. The types of goods that comprise this flow are indicative of the industries that use rail. For example, in Washington, we would expect a high level of agriculture products as part of the rail commodity outbound flows, to reflect the thriving agricultural export sector. Likewise, we would expect to see a sizeable amount of construction material as part of the inbound commodity flow, to support the construction activities related to a growing population and growing businesses.

This chapter provides an overview of the freight traffic that was handled over Washington’s rail network in 2010, using the Surface Transportation Board’s (STB) Confidential Carload Waybill Sample (Waybill Sample). Future year commodity flows (and a discussion of growth) will be included in Technical Note 4a: Freight Forecasts and Capacity Analysis of this plan.

3.1 STATEWIDE RAIL COMMODITY FLOWS

In 2010 the rail system in Washington handled approximately 116 million tons of cargo.14 As shown in Figure 3.1, 50 percent of these flows (roughly 60 million tons) were inbound to the state of Washington, compared to only 16 percent (roughly 19 million tons) of outbound flows. Almost 29 percent were through movements, meaning that they neither originate nor terminate within the state. The remaining 5 percent are local flows, meaning that they begin and end their trip within Washington.

For the sake of comparison, the flows from the 2010 Waybill Sample were compared to the 2007 commodity flow data in the 2010-2030 Freight Rail Plan (2009).15 The 2009 plan indicated that the splits between inbound, outbound, through and local moves are about 48 percent, 19 percent, 28 percent and 5 percent, respectively. These are very similar to the splits calculated in Figure 3.1. In addition, the small changes from 2007 to 2010 might suggest that inbound rail flow and through rail flow shares have slightly increased since 2007, while there has been a slight decrease in outbound rail flow shares.

14 The 2010 tonnage is similar to the 166 million tons handled in 2007 (2009 Washington State 2010-2030 Freight Rail Plan).
Figure 3.1 Annual Rail Flows in Washington by Direction of Movement, 2010
In Millions of Tons

Source: 2010 STB Confidential Carload Waybill Sample Data.

Notes: Inbound flows – Rail movements that terminate in Washington; Outbound flows – Rail movements that originate in Washington; Through flows – Rail movements that neither originate nor terminate in Washington; and Local flows – Rail movements that both originate and terminate in Washington.

Domestic vs. International Traffic

Figure 3.2 adds further detail to the 82 million tons that either originate and/or terminate within Washington (i.e., the 34 million tons of through flows are excluded). Out of a total of 82 million tons, the majority (61 percent, or about 50 million tons) were domestic flows,16 including domestic inbound flows (29 million tons), domestic interstate (8 million tons), and domestic outbound (13 million tons). International flows17 accounted for about 39 percent of total rail traffic.

16 Domestic flows are those rail commodity flows whose trade type is marked as “Domestic Only” in Freight Analysis Framework commodity flows (FAF3) database and either originate or terminate in the state of Washington.

17 International flows are defined here as those rail export flows whose trade type is marked in FAF3 data as “Exports” that terminate in the state of Washington, and those rail import flows whose trade type is marked in FAF3 data as “Imports” that originate in the state of Washington.
volumes (including 15 percent imports and the 24 percent exports). Since the Carload Waybill Sample data does not fully differentiate international trade from domestic trade, Federal Highway Administration Freight Analysis Framework Version 3.3 (FAF3.3) data was used for this analysis. Other studies have reported similar numbers. For example, Washington’s 2009 Marine Cargo Forecast technical report\(^\text{18}\) states that about 40 percent of Washington’s rail traffic is related to port activity.

**Figure 3.2  Annual Rail Flows in Washington, 2007  
*Tonnage Splits by Trade Type*

![Pie chart](source: FAF3.3 Commodity Flow Database)

- **Domestic Inbound Flows**: 35%
- **Exports**: 24%
- **Domestic Intra Flows**: 10%
- **Domestic Outbound Flows**: 16%
- **Imports**: 15%

Source: FAF3.3 Commodity Flow Database.

**Note:** The tons included belong to inbound, outbound, and intrastate flows only. The tons included are a total of “rail” and “multiple modes and rail” modes in the FAF3.3 data for the baseline year of 2007. There is room for error in this figure because some of the domestic movements could actually be part of an international supply chain.

3.2 **RAIL CARRIER SPLITS**

As shown in Figure 3.3, two Class I railroads, the BNSF Railway Company (BNSF) and the Union Pacific Railroad (UP), handle the vast majority of rail traffic within Washington: BNSF carries almost 80 percent of the tons carried in Washington—or about 64.5 million tons. The remaining 16.7 million tons are carried by UP. These splits are partially explainable by the fact that BNSF operates significantly more miles throughout Washington than UP does—1,633 miles compared to 532 miles. More information about the infrastructure of each rail line is available in Technical Note 2: *Freight and Passenger Rail Inventory* of this plan.

![Figure 3.3 Annual Rail Flows in Washington by Rail Carrier, 2010](image)

*In Millions of Tons*

Source: 2010 STB Confidential Carload Waybill Sample Data.

Note: The tons included belong to inbound, outbound, and intrastate flows only.

The “other” category represents short-line traffic. However, while the Waybill Sample properly represents traffic handled by Class I and the larger short-line and regional railroads, volume on small carriers tends to be underrepresented, due to the sampling approach. Short-line railroads offer important transportation linkages that many of the state’s industries rely on. Table 3.1 summarizes the primary commodities that are currently handled by the state’s short-line railroads. Where available (i.e., through interviews or published material), the yearly commodity volumes moved by each short line are noted. In order to
provide context for these commodity movements, the short-line rail system is shown in Figure 3.4.

Table 3.1  Commodities and Volumes\(^a\) Handled by Short-Line Railroads in Washington

<table>
<thead>
<tr>
<th>Name</th>
<th>Standard Carrier Alpha Code (SCAC)</th>
<th>Primary Commodities/Carload Volumes (Where Available)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regional (Class II)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montana Rail Link</td>
<td>MRL</td>
<td>Over 360,000 carloads and 49.7 million tons in total. Primary commodities include: lumber and wood products, farm products, ores and concentrates, nonmetallic minerals, food and kindred products, petroleum and coal products, and transportation equipment.</td>
</tr>
<tr>
<td><strong>Local (Class III)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cascade and Columbia River Railroad</td>
<td>CSCD</td>
<td>Primary commodities include lumber and other forest products.</td>
</tr>
<tr>
<td>Central Washington Railroad</td>
<td>CW</td>
<td>6,000 carloads/year. Primary commodities include: cattle feed, propane, paper products, plastic pellets, cheese, juice concentrate, lumber, apples and other agricultural goods.</td>
</tr>
<tr>
<td>Chehalis-Centralia Railroad</td>
<td>POCH</td>
<td>Not available</td>
</tr>
<tr>
<td>Columbia and Cowlitz Railway</td>
<td>CLC</td>
<td>Primary commodities include: steel, paper and chemicals.</td>
</tr>
<tr>
<td>Columbia Basin Railroad</td>
<td>CBRC</td>
<td>8,000 carloads/year. Primary commodities include: agricultural goods, inbound fertilizer, chemicals, and processed potatoes and vegetables.</td>
</tr>
<tr>
<td>Eastern Washington Gateway Railroad</td>
<td>EWG</td>
<td>4,000-5,000 carloads/year. Primary commodities include: agricultural products and metals.</td>
</tr>
<tr>
<td>Eastside Rail</td>
<td>EAST</td>
<td>Not available</td>
</tr>
<tr>
<td>Great Northwest Railroad</td>
<td>GRNW</td>
<td>12,000-15,000 carloads/year. Primary commodities include: lumber, bark, agricultural products, fertilizer, scrap iron and frozen vegetables.</td>
</tr>
<tr>
<td>Kettle Falls International Railway</td>
<td>KFR</td>
<td>Primary commodities include: lumber, plywood, wood products, minerals, metals, fertilizer, industrial chemicals and abrasives.</td>
</tr>
<tr>
<td>Palouse River and Coulee City Railroad</td>
<td>PCC</td>
<td>3,000-4,000 carloads/year. Primary commodities include: municipal trash and contaminated soil, wheat, lentils and barley.</td>
</tr>
<tr>
<td>Patriot Woods Railroad</td>
<td>PAW</td>
<td>Not available</td>
</tr>
<tr>
<td>Pend Oreille Valley Railroad</td>
<td>POVA</td>
<td>Primary commodities include: lumber and other forest products. (Part of this line is also leased to the North Pend Oreille Lions Club to facilitate Lions excursion train operations.)</td>
</tr>
</tbody>
</table>

\(^a\) Commodities and volumes are subject to change.
<table>
<thead>
<tr>
<th>Name</th>
<th>Standard Carrier Alpha Code (SCAC)</th>
<th>Primary Commodities/Carload Volumes (Where Available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland-Vancouver Junction Railroad</td>
<td>PVJR</td>
<td>600 carloads/year. Primary commodities include roofing granules, glass sand, food products and cement.</td>
</tr>
<tr>
<td>Puget Sound and Pacific Railroad</td>
<td>PSAP</td>
<td>More than 30,000 carloads in 2010. Primary commodities include lumber, automobiles, agricultural products, including grains, waste and scrap metal, aluminum, food and kindred products, and chemicals for the pulp and paper mills; and military traffic.</td>
</tr>
<tr>
<td>Royal Slope Line&lt;sup&gt;c&lt;/sup&gt;</td>
<td>RS</td>
<td>Inactive</td>
</tr>
<tr>
<td>Washington and Idaho Railroad</td>
<td>WIR</td>
<td>Primary commodities include: Forest products and agricultural commodities.</td>
</tr>
<tr>
<td>Western Washington Railroad, LLC</td>
<td>WWR</td>
<td>Not available</td>
</tr>
<tr>
<td>Yakima Central Railroad</td>
<td>YCR</td>
<td>Primary commodities include lumber and wood products.</td>
</tr>
</tbody>
</table>

**Switching and Terminal**

<table>
<thead>
<tr>
<th>Name</th>
<th>Standard Carrier Alpha Code (SCAC)</th>
<th>Primary Commodities/Carload Volumes (Where Available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballard Terminal Railroad</td>
<td>BDTL</td>
<td>100 carloads/year. Primary commodities include sand, gravel, furniture and consumer commodities.</td>
</tr>
<tr>
<td>Longview Switching Company</td>
<td>LVSW</td>
<td>Not available.</td>
</tr>
<tr>
<td>Meeker Southern Railroad</td>
<td>MSN</td>
<td>600 carloads/year. Primary commodities include wax, scrap paper, structural steel and crushed glass for recycling.</td>
</tr>
<tr>
<td>Mount Vernon Terminal Railway</td>
<td>MVT</td>
<td>500 carloads/year. Primary commodities include plastic pellets, biodiesel feedstock and empty cars. Adding Glycerin in 2013.</td>
</tr>
<tr>
<td>Tacoma Rail</td>
<td>TMBL/TRMW</td>
<td>30,000 carloads/year. Primary commodities include lumber, bricks, aluminum, pulp board, animal feed, plastic pellets, polyethylene and sand.</td>
</tr>
<tr>
<td>Tri-City and Olympia Railroad</td>
<td>TCRY</td>
<td>Primary commodities include frozen foods, metals, containers and locomotives destined for the repair shop.</td>
</tr>
</tbody>
</table>

Source: Washington State Department of Transportation (WSDOT) Railroads GIS Data; Short-line railroads web sites; State Freight Rail Plan, 2009; and personal interviews with railroad representatives conducted December 11 to 14th, 2012.

<sup>a</sup> There is no aggregate source of short-line rail volumes. They are listed here where available from web sites, published information, or interviews conducted through this Washington State Rail Plan process.

<sup>b</sup> www.povarr.com/tour/index.html.

<sup>c</sup> Line currently not in operation.
Figure 3.4  Short-Line Railroads in Washington

Sources: WSDOT; Short-line railroads web sites; 2010 to 2030 Freight Rail Plan. Western Washington Railroad is new and not shown on the map.
3.3 RAIL SERVICE COMPOSITION

Another way that railroad commodity flow data is often disaggregated is by rail service type (i.e., the characteristics of the actual shipments). The characteristics of shipments influence the type of equipment and locomotive power needed to transport them, the terminal facilities needed to handle them, and the rail network routing. The Carload Waybill Sample data uses four different rail service types to classify rail service: bulk, intermodal, auto, and general merchandise. Each of the four is briefly described below, along with an indication of the prevalence of each type within Washington’s rail network. The volumes are summarized in Figure 3.5 following.

- **Bulk** – This service type includes grain, coal and other dry and liquid bulk commodities moving in unit trains. In Washington, bulk coal accounts for almost 18 million tons, or 16 percent of total rail tonnage. Other bulk goods account for almost 41 million tons, or 35 percent of total rail tonnage, of which cereal grain (including seeds) makes up about 62 percent, or about 25 million tons. Bulk is shown as two types of bulk in Figure 3.5.

- **General Merchandise** – This service type includes all volumes not captured in the other three service types, and is comprised of traffic moving in “loose car” service. These include bulk commodities moving in single or small multi-car shipments, manufactured goods in box cars, dimension lumber on center beam flatcars, or plastic pellets in hopper cars. It also includes specialty shipments, such as aircraft fuselages or wind turbine parts moving on specialized equipment in dedicated service. In Washington, general merchandise accounts for almost 40 million tons, or 34 percent of total rail tonnage.

- **Intermodal** – This service type includes commodities moving in containers or truck trailers on flat cars or specialized intermodal cars. In Washington, this accounts for 16.6 million tons, or 14 percent of the total commodity flows.

  The demand for intermodal rail service and its share of the total rail revenue generated has been growing over the past several decades. This trend has been driven by the continually improving competitiveness with over-the-road trucking, containerization of freight, and declining direct access to the rail network for carload shipping.19

- **Auto** – This service type includes assembled automobiles, vans and trucks moving in multilevel cars. In Washington, auto service type accounts for 1 million tons, or just less than 1 percent of total statewide tonnage.

---

These different categories of rail service types are shown in Figure 3.5.

**Figure 3.5  Annual Rail Flows in Washington by Service Type, 2010**

*(In Millions of Tons)*

![Pie chart showing rail service types](image)

Source: 2010 STB Confidential Carload Waybill Sample Data.

However, as shown in Figure 3.6, the two bulk service types and the general merchandise service type carry more tons per unit than the intermodal and auto service types. For example, intermodal units generally carry a maximum of 20 tons per carload, compared to bulk trains (that carry a maximum of 100 to 120 tons per carload). This lower unit capacity for intermodal is a direct reflection of capacity limits dictated by the smaller container size and weight limits associated with highway transportation. Indeed, a comparable tonnage volume for highway will equate to two to five times the number of rail carloads. In terms of carload equivalents of traffic, intermodal service type makes up a majority (55 percent) of the total carloads for commodity flows in Washington, followed by general merchandise, bulk-other, bulk-coal and auto service types; each accounting for 19 percent, 17 percent, 7 percent and 2 percent of the total carloads, respectively.
Rail service types tend to be driven by the supply chain needs of the particular commodity. Table 3.2 lists some of the generalized rail service characteristics for select Washington ports. The Puget Sound ports (in particular, Seattle and Tacoma) are the primary users of the container service type. Rail moves about 40 percent of the total containerized tonnages from these ports, which comprised about 9 million tons of goods moved by rail in 2007. The dry bulk service type is prominent in Puget Sound, but also in the Lower Columbia ports, where it comprised almost 13 million tons of goods in 2007. These dry bulk movements in the Lower Columbia consisted primarily of grain products, along with some chemical and fertilizer products.

Source: 2010 STB Confidential Carload Waybill Sample Data.

---

Table 3.2  Annual Rail Flows by Service Type at Port Locations in Washington Based on Washington’s 2009 Marine Cargo Forecast Report, 2007 and 2010

<table>
<thead>
<tr>
<th>Service Type/“Cargo Handling Group”</th>
<th>Port Location</th>
<th>Percentage Rail Tons of Total Tonnage</th>
<th>Annual Rail Flows (in Million Metric Tons)</th>
<th>Commodity/Supply Chain Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers</td>
<td>Puget Sound</td>
<td>40%</td>
<td>8.964 (Actual) 8.657 (Forecast)</td>
<td>Trucks dominate in the export and domestic sectors, while rail dominates imports.</td>
</tr>
<tr>
<td>Neo-bulk/break-bulk cargoes</td>
<td>Lower Columbia</td>
<td>27%</td>
<td>0.706 (Actual) 0.812 (Forecast)</td>
<td>Mainly log exports split between trucks and rail.</td>
</tr>
<tr>
<td></td>
<td>Puget Sound</td>
<td>15%</td>
<td>0.544 (Actual) 0.545 (Forecast)</td>
<td>Mainly consists of automobiles and steel coils by rail.</td>
</tr>
<tr>
<td>Dry bulk (including grain and other dry bulk) cargoes</td>
<td>Lower Columbia</td>
<td>81%</td>
<td>12.702 (Actual) 12.640 (Forecast)</td>
<td>Dry bulks on the Lower Columbia consist primarily of grain products, as well as some chemical and fertilizer products. Two-thirds of this traffic is handled by rail, rest by barge. All of the grain products that originate in the Midwest move by rail.</td>
</tr>
<tr>
<td></td>
<td>Puget Sound</td>
<td>83%</td>
<td>18.070 (Actual) 17.212 (Forecast)</td>
<td>Dry bulks include grain, cement, salt, gypsum, alumina, and other chemicals and ores. All of the grain exported is received by rail. Cement, salt, and gypsum are all received directly into plants and do not require rail service.</td>
</tr>
<tr>
<td>Liquid bulk cargoes</td>
<td>Puget Sound</td>
<td>1%</td>
<td>0.501 (Actual) 0.501 (Forecast)</td>
<td>Dominated by crude oil from Alaska moving into refineries via water. Petroleum products also are shipped directly from the refineries, mostly by pipeline. Substantial volumes of liquid bulks moved to and from inland points include organic chemicals, animal oils and fats, and inorganic chemicals, as well as refined petroleum products.</td>
</tr>
</tbody>
</table>

3.4 TRADE PARTNERS

The location of key trading partners has some impact on demand on individual portions of the rail system. For example, if California were Washington’s number one trading partner, it might suggest that the north-south-oriented rail lines are the most important to support domestic trade. Figure 3.7 shows the distribution of the origins and destinations (combined) of bidirectional freight tonnage that either originates or has a destination in Washington.

As is evident from the figure, there are many different locations within the United States that use rail to transport products to and from Washington. They include the West North Central region (37 million tons, 45 percent), Mountain region (15 million tons, about 18 percent), and East North Central region (11.6 million tons, about 14 percent). These totals exclude the 33 million tons and 29 percent of traffic that is merely traveling through the state.

Figure 3.7 Annual Rail Flows by Trade Partner in Washington, 2010

Source: 2010 STB Confidential Carload Waybill Sample Data.
Note: Data represented in this graphic does not include through-flows.
3.5 **COMMODITIES MOVED BY RAIL**

As mentioned previously, understanding the types of goods that are moving on Washington’s freight rail system helps to pinpoint the industries that rely on the rail system for transportation. This section only discusses 2010 commodity flows. Future year commodity flows (and a discussion of growth) will be included in Technical Note 4a: Freight Forecasts and Capacity Analysis.

Throughout this section, origins and destinations will be discussed in the context of five regions within Washington. The counties that comprise each region are summarized in Table 3.3. These regions are based on Washington’s Regional Transportation Planning Organization (RTPO) structure, but were created for this study in order to better assess the types of commodities moving inbound and outbound from different regions of Washington.

<table>
<thead>
<tr>
<th>Table 3.3</th>
<th>Regions in Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region Name</td>
<td>RTPO Included</td>
</tr>
<tr>
<td>Peninsula/Southwest</td>
<td>Peninsula RTPO, Southwest Washington RTPO, Southwest Washington Regional Transportation Council</td>
</tr>
<tr>
<td>Central Puget Sound</td>
<td>Puget Sound Regional Council, Thurston Regional Planning Council, Whatcom Council of Governments, Skagit/Island RTPO</td>
</tr>
<tr>
<td>East Central</td>
<td>North Central RTPO, Wenatchee Valley Transportation Council, Quad-County RTPO, Yakima Valley Conference of Governments</td>
</tr>
<tr>
<td>Southeast</td>
<td>Benton-Franklin-Walla Walla RTPO, Palouse RTPO, Lewis Clark Valley Metropolitan Planning Organization</td>
</tr>
<tr>
<td>Northeast</td>
<td>Northeast Washington RTPO, Spokane Regional Transportation Council</td>
</tr>
</tbody>
</table>

Note: Region definitions are based on using Washington’s RTPO boundaries map shown at: www.wsdot.wa.gov/planning/Regional/ (last accessed on March 26, 2013).

**Inbound Commodities**

The top commodities moved inbound by rail into Washington consist of cereal grains (19.3 million tons), other agricultural products (13.5 million tons), coal (7.5 million tons), and animal feed products (3.8 percent), as shown in Figure 3.8.
More details about these commodity types, and the industries associated with them, are included in the text following this figure.21

**Figure 3.8  Top Commodities Moved Inbound by Rail in Washington, 2010**

*In Millions of Tons*

- **Cereal Grains** (including seeds and corn), and other agricultural products (including soybeans and wheat), except animal feed, are the primary inbound commodities moved by rail, totaling a combined 33 million tons of inbound rail shipments in 2010 (and 56 percent of total inbound commodity flows). Handled in unit train service, most of this volume originates in the Upper Midwest, and is destined for export through the Central Puget Sound region22 and Peninsula/Southwest region ports.

- **Coal** is a major inbound commodity, totaling more than 7.5 million tons in 2010 (13 percent of the total). Most of the coal that enters Washington comes

---

21 Note that the commodity totals described in this section include through-rail flows. Therefore, they are larger than the flows depicted in Figure 3.6.

22 Definitions of regions in Washington are located in Table 3.3 (see page 3-13).
from the Mountain region of the United States, especially the Powder River Basin region in southeast Montana and northeast Wyoming. Most of the inbound coal is destined for Central Puget Sound (about 71 percent) and Peninsula/Southwest (about 29 percent) regions. The latter region includes Centralia, which hosts the only operating coal powered generating station in Washington.  

- **Animal feed and products, not elsewhere classified**, totals almost 4 million tons of inbound rail commodities (7 percent of the total), and has destinations including the Peninsula/Southwest region (78 percent) and Central Puget Sound (about 12 percent).

- **Mixed freight** comprises about 3.5 million tons of inbound rail commodities. This category includes electronics, textile products, and other nonperishable and nonhazardous cargo. This freight is shipped primarily to the Central Puget Sound region (about 94 percent). The remaining 6 percent was destined for the Spokane region, which is the intermodal hub for the Northeast region.

- Regionally speaking, there are a few other important commodities that contribute substantial inbound rail tonnages. For the Central Puget Sound region, these include **alcoholic beverages** for domestic consumption, and **coal and petroleum products** (not elsewhere classified) and **waste and scrap** for export. The Peninsula/Southwest region receives **metallic ores and concentrates** and **wood products** for export. The Southeast region receives a large quantity of **fertilizers**. Finally, the Northeast region receives **nonmetallic mineral products**.

**Outbound**

Top commodities carried by rail to locations outside of the state include mixed freight (6.6 million tons, 36 percent of the total), wood products (2.4 million tons, 13 percent of the total), and coal (2.1 million tons, 12 percent of the total) (Figure 3.9). More details about these commodity types, and the industries associated with them, are included in the text following Figure 3.9.


24 Based on National Agriculture Statistics Service, U.S. Department of Agriculture.
Mixed freight dominates the outbound traffic mix, totaling about 6.6 million outbound tons. It almost entirely consists of imports and domestic shipments going from the Central Puget Sound region (about 99 percent) to inland locations in the United States.

Wood Products and pulp and paper products, combined, equal almost 4 million tons of outbound rail commodities. They are mainly shipped from the Peninsula/Southwest (about 55 percent), the Central Puget Sound (about 25 percent), and the Northeast (about 11 percent) regions.

The STB Waybill Data indicates that more than 2 million tons of coal originated in Washington with a destination of Oregon. Since coal is no longer mined within the state, this flow reflects a reporting anomaly in the Waybill Sample, whereby a single movement from Wyoming to Oregon is reported as two separate moves.

Regionally speaking, there are a few other important commodities that contribute substantial outbound rail tonnage. For the Central Puget Sound region, these include coal and petroleum products, nonmetallic mineral products, and base metal, which are mainly exported to Canada, or traded with the Pacific and Mountain regions of the United States. The Central Puget Sound region also imports motorized vehicles and parts and sends them to...
inland U.S. locations. The Peninsula/Southwest region exports basic chemicals to Canada and also ships them to the Mountain and Pacific regions of the United States. The Peninsula/Southwest region also trades a substantial amount of base metal with the Pacific region of the United States. The East Central and the Southeast regions are engaged in substantial production of other prepared foods stuffs, fats, and oils that get shipped to the Midwest and Atlantic regions of the United States. The Southeast region also supplies fertilizers mainly to the Pacific region of the United States, and other agricultural products, except animal feed products to the East North Central region of the United States.

**Intrastate**

In general, railroads favor long-haul movements with a high density of traffic. Short-haul moves of less than 500 miles tend to be less desirable operationally and financially for railroads. Short-haul traffic is more service sensitive and thus has greater difficulty competing with motor carriage. Furthermore, terminal handling costs, which are the same irrespective of length of haul, must be distributed over a smaller revenue base. Where they do successfully compete is in situations where densities are high, and/or there are substantial advantages to handling commodities in rail equipment, such as is the case with some bulk commodities. Short-haul rail is also viable in situations where local roadway infrastructure is inadequate to handle heavy trucking. As expected, therefore, Figure 3.10 only includes a few million tons moved by rail within the state. This includes 1.7 million tons of waste and scrap and 1.2 million tons of cereal grains.

- The largest commodity moved intrastate by rail is waste and scrap, which comprises about 1.7 million tons of rail freight. Waste and scrap is produced in the Central Puget Sound, Peninsula/Southwest, and Northeast regions, transported intermodally, and exported through the seaports.  

- Cereal grains (including seeds and corn), and other agricultural products (including soybeans and wheat), except animal feed, are produced mainly in the East Central and Southeast regions of Washington, and exported through the seaports in the Peninsula/Southwest region and Central Puget Sound region ports.

---

Figure 3.10  Top Commodities Among Intrastate Annual Rail Flows in Washington, 2010  
In Millions of Tons

- Coal and petroleum products (not elsewhere classified) are produced at refineries located at Cherry Point, Anacortes and Ferndale\(^\text{27}\) and shipped to all parts of the state by rail.
- Basic chemicals are mainly produced in the Peninsula/Southwest region of the state and shipped by rail to different parts of the state.
- The Northeast region is the main supplier of natural sands by rail that is used for construction activities in the densely populated regions of the state.

---

4.0 Train Volumes

This section will discuss current (2010) train volumes moving on Washington’s freight rail system. These train volumes are generated from several sources of information. For example, actual total train volume counts\(^{28}\) were used wherever possible. However, train counts are not available for every segment of Washington’s rail network. Therefore, in order to gain a more holistic understanding of the entire state rail system, train volumes for 2010 were estimated over those segments for which data were not available. The estimation methodology is summarized in Appendix A.4. It is similar in approach to the 2007 Association of American Railroads (AAR) National Rail Freight Infrastructure Capacity and Investment Study,\(^{29}\) and relies on the use of the Surface Transportation Board (STB) Waybill Data in coordination with Federal Highway Administration Freight Analysis Framework Version 3.3 Commodity Flow Database and other data sources.

Figure 4.1 shows the outcome of this process in terms of 2010 daily freight train volumes. The map shows the relative levels of traffic on major corridors and certain key branch lines on which Class I railroads operate. The 2010 freight rail train volumes and train mix information are mapped using a combination of train counts data from the Class I railroads and estimation of 2010 train volumes. It should be noted that the train volumes are dynamic and may have changed since the 2010 data was published. For example, operational changes in mid-2012 have led to increases in volume over the Seattle-Pasco route and overall efficiencies in the network; while routing changes from these operational adjustments are reflected on the 2010 volumes (increasing the Auburn-Pasco volumes from two trains per day to six trains per day), they illustrate the potential for change over time.

The key findings based on the 2010 rail volume analysis are:

- The BNSF Railway’s (BNSF) Spokane-Sandpoint, Idaho (ID) corridor has the highest current (2010) train volumes, carrying 48\(^{30}\) daily trains.
- The BNSF’s Seattle-Pasco corridor has the least amount of 2010 freight rail traffic, carrying only six daily trains.
- The Seattle-Portland corridor has the highest volume of passenger rail traffic (18 Sounder – commuter rail, eight Amtrak Cascades – intercity rail, and two


\(^{29}\) www.aar.org/~media/aar/Files/natl_freight_capacity_study.ashx (last accessed on October 19, 2012).

\(^{30}\) Does not include the short segment in the Spokane vicinity, Sunset Junction-Spokane.
Coast Starlight – long-distance rail daily services). These trains share the track with 18 daily freight trains. Two centralized traffic control-based main line tracks between Seattle and Tacoma currently are in use to reduce conflicts in scheduling.

• Almost 94 percent of the state’s east-west bulk cargo rail traffic, a majority of which is traveling westbound, uses a circuitous path of Spokane-Pasco-Vancouver-Puget Sound (about 550 miles). This more circuitous route between Spokane and Puget Sound is used instead of the more direct routes over Stevens Pass (about 325 miles) and Stampede Pass (about 400 miles) due to steep grades and tunnel-related capacity constraints.

• For east-west bulk traffic originating and terminating in the Southwest region of Washington, the path is less circuitous. The bulk trains are built mainly at Longview (for both BNSF and UP) and Pasco Yards (for BNSF), and/or interchanged with short lines.

• Most of the BNSF intermodal and auto rail traffic (about 13 daily trains) from/to the Central Puget Sound region (in particular, Seattle International Gateway and Tacoma Yards) is routed through Seattle-Spokane corridor via Wenatchee Yard.

• In comparison, smaller volumes of intermodal and auto traffic are contributed by BNSF intermodal yards in Portland, Oregon (Oregon); and BNSF Oregon Trunk line to Seattle-Portland (about 2.5 daily trains) and Portland-Pasco (about 6.9 daily trains) corridors in Washington.

• UP uses trackage rights on BNSF’s Seattle subdivision between Portland (Oregon) and Tacoma to reach the Puget Sound region. Between Tacoma and Seattle, UP routes its traffic on its own track over a former Milwaukee Road segment. In eastern Washington, UP operates its own route between a gateway with the Canadian Pacific in Eastport, Idaho; Spokane; and Hinkle, Oregon. At Hinkle, the line links with UP’s transcontinental route to Omaha, Nebraska.

• The traffic crossing the Columbia River between Vancouver and Portland is about 29 trains split between BNSF (38 percent) and UP (62 percent).

Routing decisions made by the railroads are the result of numerous factors, and can sometimes appear counterintuitive. Beyond the origin and destination of the traffic, routing considerations may include gradients and curvature or other geometric limitations, train mix, line and yard capacities, and condition of track infrastructure. Understanding routing patterns can help public agencies to anticipate future train volumes, as well as pinpoint likely corridors to be targeted for future infrastructure and operational improvements.
Figure 4.1  Average Known and Estimated Daily Train Volumes and Capacity, 2010


NOTE: Directional running of trains is assumed on the Stampede Pass route (Auburn-Pasco via Yakima) in the State of Washington, which was implemented by BNSF as an operating rule in 2012. Volumes include freight and passenger trains.
A. Appendix

A.1 Other Demand Drivers for Freight Rail Usage in Washington

National Post-recession Economy and Unemployment

The U.S. Economy, as indicated by real Gross Domestic Product (GDP) growth, began to recover from the ongoing economic recession in mid-2009. Economic recovery will generally dictate increase in demand, as people and businesses once again are able to spend or expand their operations. However, the pace of growth is slow—and in fact, GDP growth actually decelerated during 2011. In addition, the nation continues to struggle with relatively high unemployment. As of 2011, about 8.3 percent of the population was unemployed. A high level of unemployment is negatively correlated with consumption and thus affects demand for goods.

Global Changes in Manufacturing for U.S. Economy

The last 30 years have seen unprecedented growth in economic globalization and multi-country trading. Supply chains have grown increasingly far-flung and global in nature. These are driven by lower transportation costs and reduced barriers to trade through multinational treaties and agreements, such as the 1994 North American Free Trade Agreement (NAFTA) and the agreements associated with the admission of China into the World Trade Organization (WTO) in 2001. However, these processes are reversible, and the introduction of risk due to fluctuating or rising fuel prices may have considerable impact. In an article published in 2008, Jeff Rubin and Benjamin Tal stated that “Globalization is reversible. Higher energy prices are impacting transport costs at an unprecedented rate.” They called rising transportation costs the “largest barrier to global trade today” and argued that continuously rising prices could lead to a “fundamental realignment in trade patterns.” Higher energy costs, or wildly fluctuating energy costs, may lead companies to rethink their far-flung supply

---

34 Ibid.
chains, which require transporting goods many miles between different countries.

In addition, continued focus on risk management in the supply chain could lead to more diversification of sourcing and resulting trade flows, which may cause changes in network utilization, including ports of entry. For example, there is growing evidence that a variety of economic forces—including rising costs of labor in China and rising transportation costs—may lead to a return of some manufacturing production to the NAFTA region and Central America. This would clearly have an impact on existing supply chains, including potentially changing the balance of goods at different U.S. gateways. In fact, an economic assessment performed in 2011 suggested that, by 2015, many goods destined for North American consumers will be just as economical to manufacture in parts of the United States as in China.\(^\text{35}\) This would potentially mean that the railroads would have to reconsider their routing options or infrastructure investments to adapt to these shifts.

### Shifts in Oil Trade and Trends in Fuel Prices

In the United States, oil domestic production is the highest since 2003, leading to a decline in the amount of oil imported from other countries.\(^\text{36,37}\) However, oil prices are still high relative to 2009 levels or before, and have fluctuated substantially in the last five years, as shown in Figure A.1.

Fluctuating fuel prices impact transportation costs in several ways. First, rising costs may trigger changing distribution systems and logistics chains in order to shorten the supply chains, save fuel and save money. This can have ripple effects to the markets previously served by these supply chains, as well as the relative competitiveness of the different modes that serve those markets. In addition, rising transportation costs may lead businesses to pass on the costs to consumers in the form of higher prices. This could potentially result in a decrease in overall demand for goods and services.

\(^{35}\) Made in America, Again – Why Manufacturing will Return to the U.S., Boston Consulting Group, 2011.


Figure A.1  Trends in Fuel Prices, Gasoline and Crude Oil Prices, January 2008 to January 2013


Rail Transportation Readiness to Meet Future Demand

The American Society of Civil Engineers (ASCE) graded U.S. rail infrastructure with a C– in the year 2009. In addition, the ASCE noted that the rail industry requires $200 billion in investment by 2035 to meet projected future demand. Clearly, this is a huge price tag for infrastructure improvements, regardless of who pays for them. The ability of the railroads and their public partners to meet this demand will dictate the health of freight rail infrastructure into the future.

West Coast Coal Exports

Coal is in increasing demand in many Asian countries (China, in particular), as their economies continue to grow and demand electricity. Unable to meet demand with supplies from internal sources, Asian countries are increasingly looking abroad for coal sources. The Powder River Basin in southeast Montana and northeast Wyoming, with its vast supplies of coal, is an attractive source for this coal demand.

38 www.infrastructurereportcard.org/fact-sheet/rail.
Currently, there are several proposal considerations to enhance port capacity along the U.S. Pacific Coast to link this supply with demand. Two potential sites in Washington have been suggested for future development:

1. Gateway Pacific Terminal at Cherry Point (Carrix/SSA Marine, Peabody Energy). The terminal would be located at Cherry Point, which is about 17 miles south of the Canadian border, has naturally deep water that will accommodate ships without the need for dredging. This terminal is proposed to be a dry bulk cargo-handling facility on nearly 1,500 acres in Whatcom County, Washington.40


Both sites are being evaluated as coal-handling projects, in addition to other sites in the United States and in Canada. The development of these coal ports, or any coal port within the United States, could increase the demand for rail service through Washington. More information is expected to emerge during the feasibility studies planned for 2013 and later. For example, an environmental impact statement is underway for the Gateway Pacific Terminal as of January 7, 2013.41

**Competition from the Trucking Industry and Trends**

Generally, the trucking industry serves as the biggest competitor to the rail industry. Trucks have an advantage over rail as they provide door-to-door service. In most of the cases, the goods transported by rail also are picked up and delivered by trucks, which is also called “drayage.” The goods carried by rail are, on average, of a lower value than trucks, and typically less time sensitive. The average haul length for goods moved over rail is higher than that by trucks, as a majority of “Less than Truck Load” truck moves are local. Table A.1 shows the breakdown of shipments by mode originating in the state, based on 2007 Commodity Flow Survey data.42

---

40 [http://gatewaypacificterminal.com/the-project](http://gatewaypacificterminal.com/the-project).
41 Ibid.
Table A.1  Shipments Originating in Washington by Mode, 2007

<table>
<thead>
<tr>
<th>Mode</th>
<th>Value (Millions) Dollars</th>
<th>Percent</th>
<th>Tons</th>
<th>Number (Thousands)</th>
<th>Percent</th>
<th>Ton-Miles</th>
<th>Number (Millions)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>$127,098</td>
<td>59.0</td>
<td></td>
<td>178,612</td>
<td>72.9</td>
<td></td>
<td>28,746</td>
<td>45.8</td>
</tr>
<tr>
<td>Rail</td>
<td>$5,218</td>
<td>2.4</td>
<td></td>
<td>9,357</td>
<td>3.8</td>
<td></td>
<td>7,970</td>
<td>12.7</td>
</tr>
<tr>
<td>Truck and rail</td>
<td>$4,322</td>
<td>2.0</td>
<td></td>
<td>2,986</td>
<td>1.2</td>
<td></td>
<td>4,773</td>
<td>7.6</td>
</tr>
</tbody>
</table>


a Include for-hire and private trucks.

The railroads pay on their own for the costs of way/track maintenance, while trucks use public roads to which they contribute fees and taxes. Not taking into account the drayage movements, rail is more fuel efficient than trucks. Even in terms of emission rates (that is, emissions per ton-mile), rail performs much better than trucks.

A.2 2007 NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) FREIGHT INTENSIVE INDUSTRY SECTOR DEFINITIONS

Sector 11: Agriculture, Forestry, Fishing and Hunting

The Agriculture, Forestry, Fishing and Hunting sector comprises establishments primarily engaged in growing crops, raising animals, harvesting timber and harvesting fish and other animals from a farm, ranch or their natural habitats.

The establishments in this sector are often described as farms, ranches, dairies, greenhouses, nurseries, orchards or hatcheries. A farm may consist of a single tract of land or a number of separate tracts, which may be held under different

---


tenures. When a landowner has one or more tenants, renters, croppers or managers, the land operated by each is considered a farm.

The sector distinguishes two basic activities: agricultural production and agricultural support activities. Agricultural production includes establishments performing the complete farm or ranch operation, such as farm owner-operators, tenant farm operators and sharecroppers. Agricultural support activities include establishments that perform one or more activities associated with farm operation, such as soil preparation, planting, harvesting and management, on a contract or fee basis.

Excluded from the Agriculture, Forestry, Hunting and Fishing sector are establishments primarily engaged in agricultural research; and establishments primarily engaged in administering programs for regulating and conserving land, mineral, wildlife and forest use. These establishments are classified in Industry 54171, Research and Development in the Physical, Engineering and Life Sciences; and Industry 92412, Administration of Conservation Programs, respectively.

**Sector 21: Mining, Quarrying and Oil and Gas Extraction**

The Mining, Quarrying and Oil and Gas Extraction sector comprises establishments that extract naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas. The term mining is used in the broad sense to include quarrying, well operations, beneficiating (e.g., crushing, screening, washing and flotation) and other preparation customarily performed at the mine site, or as a part of mining activity.

The Mining, Quarrying and Oil and Gas Extraction sector distinguishes two basic activities: mine operation and mining support activities. Mine operation includes establishments operating mines, quarries or oil and gas wells on their own account or for others on a contract or fee basis. Mining support activities include establishments that perform exploration (except geophysical surveying) and/or other mining services on a contract or fee basis (except mine site preparation and construction of oil/gas pipelines).

**Sector 22: Utilities**

The Utilities sector comprises establishments engaged in the provision of the following utility services: electric power, natural gas, steam supply, water supply and sewage removal. Within this sector, the specific activities associated with the utility services provided vary by utility: electric power includes generation, transmission and distribution; natural gas includes distribution; steam supply includes provision and/or distribution; water supply includes treatment and distribution; and sewage removal includes collection, treatment and disposal of waste through sewer systems and sewage treatment facilities.
Excluded from this sector are establishments primarily engaged in waste management services classified in Subsector 562, Waste Management and Remediation Services. These establishments also collect, treat and dispose of waste materials; however, they do not use sewer systems or sewage treatment facilities.

**Sector 23: Construction**

The Construction sector comprises establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems). Establishments primarily engaged in the preparation of sites for new construction and establishments primarily engaged in subdividing land for sale as building sites are also included in this sector.

There are substantial differences in the types of equipment, workforce skills and other inputs required by establishments in this sector. To highlight these differences and variations in the underlying production functions, this sector is divided into three subsectors.

- **Subsector 236, Construction of Buildings** comprises establishments of the general contractor type and operative builders involved in the construction of buildings.
- **Subsector 237, Heavy and Civil Engineering Construction** comprises establishments involved in the construction of engineering projects.
- **Subsector 238, Specialty Trade Contractors** comprises establishments engaged in specialty trade activities generally needed in the construction of all types of buildings.

**Sectors 31 to 33: Manufacturing**

The Manufacturing sector comprises establishments engaged in the mechanical, physical or chemical transformation of materials, substances or components into new products. The assembling of component parts of manufactured products is considered manufacturing, except in cases where the activity is appropriately classified in Sector 23, Construction.

Establishments in the Manufacturing sector are often described as plants, factories or mills; and characteristically use power-driven machines and materials-handling equipment. However, establishments that transform materials or substances into new products, by hand or in the worker’s home, and those engaged in selling to the general public products made on the same premises from which they are sold, such as bakeries, candy stores and custom tailors, also may be included in this sector. Manufacturing establishments may process materials or may contract with other establishments to process their materials for them. Both types of establishments are included in manufacturing.

The subsectors in the Manufacturing sector generally reflect distinct production processes related to material inputs, production equipment and employee skills.
Sector 42: Wholesale Trade

The Wholesale Trade sector comprises establishments engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The merchandise described in this sector includes the outputs of agriculture, mining, manufacturing and certain information industries, such as publishing.

The wholesaling process is an intermediate step in the distribution of merchandise. Wholesalers are organized to sell or arrange the purchase or sale of: 1) goods for resale (i.e., goods sold to other wholesalers or retailers); 2) capital or durable non consumer goods; and 3) raw and intermediate materials and supplies used in production.

This sector comprises two main types of wholesalers: merchant wholesalers that sell goods on their own account; and business-to-business electronic markets, agents and brokers that arrange sales and purchases for others generally for a commission or fee.

Sectors 44 to 45: Retail Trade

The Retail Trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

The retailing process is the final step in the distribution of merchandise; retailers are, therefore, organized to sell merchandise in small quantities to the general public. This sector comprises two main types of retailers: store and non-store retailers.

Store retailers operate fixed point-of-sale locations, located and designed to attract a high volume of walk-in customers. Non-store retailers, like store retailers, are organized to serve the general public, but their retailing methods differ. The establishments of this subsector reach customers and market merchandise with methods, such as the broadcasting of “infomercials,” the broadcasting and publishing of direct-response advertising, the publishing of paper and electronic catalogs, door-to-door solicitation, in-home demonstration, selling from portable stalls (street vendors, except food) and distribution through vending machines.

Sectors 48 to 49: Transportation and Warehousing

The Transportation and Warehousing sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation and support activities related to modes of transportation. Establishments in these industries use transportation equipment or transportation-related facilities as a productive asset. The type of equipment depends on the mode of transportation. The modes of transportation are air, rail, water, road and pipeline.
The Transportation and Warehousing sector distinguishes three basic types of activities: subsectors for each mode of transportation, a subsector for warehousing and storage and a subsector for establishments providing support activities for transportation. In addition, there are subsectors for establishments that provide passenger transportation for scenic and sightseeing purposes, postal services and courier services.

Many of the establishments in this sector often operate on networks with physical facilities, labor forces and equipment spread over an extensive geographic area.

Warehousing establishments in this sector are distinguished from merchant wholesaling, in that the warehouse establishments do not sell the goods.

**NAICS Industry Sector 562: Waste Management and Remediation Services**

Industries in the Waste Management and Remediation Services subsector group establishments engaged in the collection, treatment and disposal of waste materials. This includes establishments engaged in local hauling of waste materials; operating materials recovery facilities (i.e., those that sort recyclable materials from the trash stream); providing remediation services (i.e., those that provide for the cleanup of contaminated buildings, mine sites, soil or ground water); and providing septic pumping and other miscellaneous waste management services. There are three industry groups within the subsector that separate these activities into waste collection, waste treatment and disposal, and remediation and other waste management.

Excluded from this subsector are establishments primarily engaged in collecting, treating and disposing waste through sewer systems or sewage treatment facilities that are classified in Industry 22132, Sewage Treatment Facilities; and establishments primarily engaged in long-distance hauling of waste materials that are classified in Industry 48423, Specialized Freight (except Used Goods) Trucking, Long Distance.

### A.3 COMMODITY FLOWS DATA SOURCES

This section discusses the commodity flows data used to conduct an assessment of the current freight rail system operations and markets.

**2010 Confidential Carload Waybill Sample – Surface Transportation Board (STB).** The Waybill Sample is an annual survey of railcar movements on the national rail network from railroads that have terminated at least 4,500 cars per year for each of the previous three years, or have moved five percent or more of any state’s total rail traffic. The survey collects information from a sample of loaded, revenue-producing railcar movements. The data include information about the commodity shipped, the type of railcar used, the origin and destination station of the shipment, any interchanges of the shipment between railroads, and
the identities of the railroads handling the shipment. The sample data are statistically expanded to represent 100 percent of loaded revenue-producing railcar moves in a year. The Waybill Sample is used in many regulatory proceedings and is generally considered an accurate reflection of U.S. freight-railroad shipments.

The Waybill dataset was used to assemble county-to-county 2010 tonnage estimates of rail flows and information on railway routing. It was provided to the Washington State Department of Transportation under a confidential user agreement.

**Federal Highway Administration (FHWA) Freight Analysis Framework Version 3.3 (FAF3.3).** Developed and provided by the FHWA, FAF3.3 provides tonnage estimates by commodity type, mode, and 123 U.S. regions that consist of major metropolitan areas, state remainders and 16 entire states. The primary basis for FAF3.3 is a 2007 survey of the shipping behavior of 100,000 U.S. manufacturers and wholesalers (i.e., the Commodity Flow Survey), supplemented by the Journal of Commerce’s Port Import Export Reporting System (PIERS), the U.S. Army Corps of Engineers’ Waterborne Commerce Database, and the STB’s Carload Waybill Sample for rail. The forecast incorporated into FAF3.3, produced by IHS-Global Insight using Q2 2010 as the base period, was applied to the 2007 Carload Waybill sample to project volumes in 2040, as well as the intermediate years of 2015, 2020, 2025, 2030 and 2035. The last updated version of FAF3.3 is Version 3.3, dated July 1, 2012. This data formed the basis for the future year (2035) freight rail flows forecasting.

**TradeStats Express™ Data – U.S. Department of Commerce.** TradeStats Express displays the latest annual U.S. merchandise trade statistics:

- At national and state levels.
- In maps, graphs and tables.
- As exports, imports and trade balances.
- Custom-tailored to your year, dollar ranges and display preferences.

The trade data are available as full year totals for 1989 through 2009 and Year-to-Current-Quarter for 2009 through June 2012. Data are available for individual countries, trade/economic groups or geographic regions. These statistics can be tabulated using any of three product classification systems: Harmonized System (at two- and four-digit levels); NAICS (up to the four-digit level); or Standard International Trade Classification (up to the three-digit level). The data can be displayed for exports, imports or balance of trade.
A.4 DATA AND METHODOLOGY FOR DETERMINING TRAFFIC (TRAIN SERVICE TYPE) MIX BY RAIL SEGMENT

Daily total train volume counts\textsuperscript{46} at several locations of Washington rail network were collected from the railroads, but this is not sufficient for describing the freight rail traffic. Therefore, this section describes the methodology used for estimation of service type mix of freight trains by rail segment. It is similar in approach to the 2007 Association of American Railroads (AAR) National Rail Freight Infrastructure Capacity and Investment Study.\textsuperscript{47}

The AAR methodology uses the annual carloads data from the Carload Waybill Sample data, along with the information on its origin, destination and transporting railroad. Then a model-based assignment is done to automatically estimate the total daily freight train volumes by rail segment.

However, there are situations where the estimated train volumes can be either lower or higher than the actual train volumes. This can happen due to the following reasons: 1) the Carload Waybill Sample data uses expansion factors to estimate the annual train volumes, which may not be accurate; 2) there are simplifications to the rail network model and assignment method in the AAR approach resulting in incorrect routing; and 3) the general railroad assumptions made in the AAR study for estimation of number of daily trains from carloads, including cars per train and empty return ratios, do not reflect current operations of Class I railroads in Washington.

Therefore, adjustments were made to routing, as well as the assumptions used in estimation of number of daily freight trains from carloads. For example, a large number of carload/container trains originating or terminating in the Central Puget Sound region were assigned to Stampede Pass corridor by the model. In practice, this corridor has a limited number of train movements, for several reasons. For one, the ceiling of the Stampede Tunnel is too low to accommodate double-stack intermodal container trains. In addition, Stampede Pass has a steep grade requiring a very high number of locomotives to power these trains. The routing of these movements received adjustment.

The carloads per train values by individual Class I railroads replaced the general railroad assumptions made in the AAR study. The latest 2011 Uniform Rail Costing System (URCS) data\textsuperscript{48} on empty return ratios for BNSF Railway, Union Pacific Railroad, and other western railroads was used to improve the daily

\textsuperscript{46} BNSF 2010 Train Counts Data for State of Washington, and UP 2012 Q1 Train Counts Data for Spokane-Eastport, Idaho corridor.
\textsuperscript{47} www.aar.org/~/media/aar/Files/natl_freight_capacity_study.ashx (last accessed on October 19, 2012).
\textsuperscript{48} www.stb.dot.gov/stb/industry/urcs.html (last accessed on October 19, 2012).
freight train volume estimates. To these estimates, the current passenger rail services were added to estimate the total daily train volumes by rail segment.

Based on the above adjustments, the total daily train volume estimates were found to be in general agreement with the base year train volume counts. The ratio of the estimates to the actual counts ranged between 0.6 and 1.3 with very few exceptions, with a mode value of 0.8. This indicates that the model after adjustments estimated train volumes in a slight excess of actual train counts.

Accepting the model changes, both the model-based train volume estimates for locations with no base year total train volume counts, and traffic mix for all segments (including locations with base year total train volume counts) were determined and used in describing the current rail traffic in this technical note.

The methodology described above, with the exception of the validation step, will be applied on the carload/container forecasts that are being developed as part of this State Rail Plan to determine the growth by rail segment and forecast year train service type mix.

In addition, the 2007 AAR study, as mentioned above, states that the railroads are anticipating improvement in train productivity by up to 0.5 percent per year up to 2035. Accounting for this, in the forecast year (2035) train estimation, the compounded annualized growth rates or growth factors that are used to estimate the forecast year (2035) flows were thus reduced by this percentage.

These results will be presented in Technical Note 4a of this State Rail Plan.