Oregon State Rail Plan

Freight and Passenger Rail System Inventory

draft

report

prepared for

Oregon Department of Transportation

prepared by

Cambridge Systematics, Inc.

March 31, 2014

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1.0 Introduction

The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) tasks states with producing a State Rail Plan (SRP) to establish policy, priorities and implementation strategies for freight and passenger rail transportation within its boundaries, enhance rail service in the public interest, and serve as the basis for federal and state rail investments within the state. PRIIA requires state rail plans be submitted to the Federal Railroad Administration (FRA) for review and approval (Section 302 of PRIIA, codified at 49 U.S.C. 24105).[1] PRIIA also authorizes capital grants for the development of intercity passenger rail (Section 301 of PRIIA, codified at 49 U.S.C. Chapter 244), the development of high-speed rail corridors (Section 501 of PRIIA, Public Law 110-432, Division B, codified at 49 U.S.C., 26101 et seq.), and high priority freight and passenger (intercity and commuter) rail projects.

This Oregon State Rail Plan responds to the recommendations and requirements of PRIIA, and updates the previous State Rail Plan completed in 2001. It addresses a broad spectrum of rail issues in Oregon, including identification of the State's freight and passenger rail goals and objectives, development of an inventory of rail system infrastructure, analysis of rail-related economic and environmental impacts, articulation of the State's policies governing investment in both passenger and freight rail, and establishment of a long-range investment program for current and future passenger and freight rail infrastructure throughout Oregon.

This Technical Memorandum - *Freight and Passenger Rail System Inventory* - presents an inventory of the rail transportation system, rail services and facilities within Oregon. It includes a review of all existing and planned rail lines within the state, including proposed high-speed and intercity passenger rail corridors, commuter rail, Class I freight corridors, non-Class I lines, and significant rail line segments currently in service. In addition, this memorandum documents the system operating characteristics, including freight, passenger (intercity and commuter) rail.

This memorandum integrates the planning work previously done by ODOT, Amtrak and the TriMet's WES (Westside Express Service) commuter rail system into a single summary planning document; the ongoing Oregon Passenger Rail (OPR) Environmental Impact Statement (EIS)/Corridor Investment Plan (CIP), TriMet's Service Enhancement Plans, and the recently completed Oregon Freight Plan (2011) and Oregon Rail Study (2010), together form a backbone for this memorandum.

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[1] Federal Railroad Administration. State Rail Plan Guidance, August 2012.

The outline of this document is as follows:

- **Section 2.0 Freight Rail System Profile -** This section provides a detailed inventory of the freight rail system in Oregon. It presents the history and evolution of railroads in Oregon, an overview of Class I and non-Class I line freight railroads, a description of existing fixed infrastructure, its condition and operating characteristics, and rail abandonments. In addition, it includes detailed base (2010) and future (2035) commodity flow profiles and estimates of train volumes.
- **Section 3.0 Passenger Rail System Profile -** This section provides a detailed inventory of existing passenger rail systems in Oregon by service category, namely, intercity (including long-distance) and commuter rail. For each rail service, details on route history and evolution, route administration, operations, maintenance, planning and funding, equipment and fleet, operating statistics and performance, stations and transit connections are discussed. In addition, base (2010) usage is indicated.

2.0 Freight Rail System Profile

Preserving and enhancing the efficiency of the freight rail system in Oregon, like all other freight transportation systems, is essential to supporting economic development and quality of life. The freight rail system in Oregon provides important services to the state's businesses and residents, including carrying goods from Oregon manufacturers, farmers and other producers to markets throughout the U.S. and beyond, and delivering goods to supply many of Oregon's key industries and growing consumer population. This section profiles the freight rail system in Oregon through the following two sections:

- **Freight Railroads, Rail Infrastructure and Operations.** This subsection contains:
  - Descriptions of the existing fixed rail infrastructure in Oregon including details of its evolution, details of the Class I and non-Class I line railroads, details of intermodal/rail terminal locations, as well as abandonments.
  - An overview of key operational characteristics and condition, including signal type, weight capacity and maximum speed, vertical clearance restrictions, at-grade crossings, and bridges.
- **Existing and Future Freight Rail Demand.** This subsection contains:
  - An overview of freight flows in Oregon in the current and future year.
  - Commodity flow profiles for base (2010) and future (2035) years. Base year analysis includes flows by service type, direction, commodity, trading partners with Oregon as well as key intrastate rail origins/destinations. Future year rail traffic includes analysis of growth by direction and commodity type.
  - Base and future year train volumes on Oregon rail lines.

2.1 Freight Railroads, Rail Infrastructure and Operations

The freight rail system in Oregon is part of a nationwide, interconnected system of rail infrastructure and services that link the state and local regions to the rest of North America as well as the world through international marine gateways. These include the Port of Portland, other Columbia River ports, and several ports on the Pacific Coast. The infrastructure supporting these services in Oregon is substantial, and includes various carload and intermodal facilities, along with some significant tunnels and bridges that are necessary to surmount the state's rugged topography.

The purpose of this section is four-fold: (a) to present the history and evolution of freight railroads; (b) to describe the rail industry classifications of the existing freight rail services; (c) to inventory the location and extent of existing fixed rail infrastructure by freight railroad; and (d) to present an assessment of physical conditions and operations of the existing fixed rail infrastructure by railroad.

History and Evolution of Freight Railroads in Oregon

The history of freight railroads in Oregon parallels that of the country as whole. Many of the original rail lines were built in the late 1800s and early 1900s to efficiently export the state's vast natural resources to eastern markets. Rail mileage in Oregon peaked in the 1930s at nearly 4,350 miles. Following World War II, rail started losing market share to trucks. This rapidly increasing competition, an outdated and unresponsive regulatory regime, and sclerotic management led to a steady financial decline of most railroads. As traffic disappeared and financial losses grew, the railroads moved to abandon poorly performing lines, shed passenger operations, and gain efficiencies through consolidation. Passenger service became a federal responsibility in 1971 through the creation of Amtrak.

The most notable of the initial round of mergers was the 1968 creation of Penn Central (PC) in the east, and the 1970 establishment of Burlington Northern (BN) in the west. While the PC failed spectacularly in 1970, the BN merger – a combination of the Northern Pacific, Great Northern, Spokane Portland & Seattle (SP&S), and the Chicago Burlington & Quincy railroads, plus subsidiaries - proved successful, and set the stage for ongoing industry consolidation that culminated in the 1990s. In the west, BN combined with the Atchison Topeka & Santa Fe Railway to form Burlington Northern Santa Fe Railway (BNSF) in 1995, and the Union Pacific (UP) acquired the long-struggling Southern Pacific (SP) in 1996. Concurrent with the mergers, railroads moved to spin off and abandon underperforming lines. Non-Class I line operators could carry out operations at lower cost and be more responsive to customer needs. In some instances, the new operators succeeded in revitalizing these marginal lines by building up traffic, while in others they simply staved off abandonment for some period of time.

The evolution of the key rail lines in Oregon are described below.

- **Siskiyou Line between Eugene and Ashland** – The first north-south rail line (Siskiyou line) through the Willamette Valley and into California was built by a succession of entrepreneurs and business rivals between 1868 and 1887. Track reached Salem in 1870 and Roseburg in 1872, but did not extend to Ashland until 1884. Federal land grants financed this early track building. Construction continued over the Siskiyou Mountains into California by SP and, by 1887, a continuous route between San Francisco and Portland was completed. In September 1926, SP completed an alternative route between Black Butte, California and Eugene, Oregon via Klamath Falls, Chemult, and Oakridge. The shorter length and easier grades made the Klamath Falls route

SP's principal route and relegated the Siskiyou line to a secondary role. Eventually, declining forest products traffic led SP to sell 219 miles of the Siskiyou line between Springfield Junction and Belleview to the Central Oregon & Pacific Railroad (CORP) in 1994.[2]

- **Transcontinental Lines –** Meanwhile, in 1883, completion of a railroad along the Columbia River gave Oregon a transcontinental connection across the northern tier states. Late in 1884, completion of a line from Umatilla over the Blue Mountains established a second transcontinental link through Idaho and Utah, where it connected with the UP's transcontinental route to Omaha, Nebraska. By 1896, the transcontinental routes were operated by the newly formed Oregon Railroad and Navigation Company (OR&N) through a consolidation of several smaller railroads. In succession, OR&N became Oregon-Washington Railroad & Navigation Company (OWR&N), a UP subsidiary in 1910, and an integral part of the UP rail system in 1936.[3]

  BNSF predecessor Northern Pacific (NP) initially accessed Oregon from Tacoma in 1883 through a rail/ferry connection via Kalama, Washington, approximately 40 miles downstream from Portland. The completion of NP's transcontinental route in 1888 offered access to the growing national network, but the cost and extended travel time associated with the ferry crossing impeded traffic growth. This obstacle was eliminated when the NP and competing Great Northern (GN) came under the common control of James J. Hill in the early 1900s. In 1908, Hill's newly established subsidiary, the Spokane Portland & Seattle Railway, completed a line westward from Pasco along the northern shore of the Columbia River to Vancouver, Washington, and a direct link to Portland through a series of three bridges. The SP&S ceased existing as a separate entity in 1970 when it was folded into the Burlington Northern (BN).

- **Oregon Trunk Line –** The second north-south rail line in the state, the Oregon Trunk Railway, was a participant in the last major railroad war in the early 1900s. Competition turned into cooperation during the Great Depression through abandonment of one of the parallel rail lines and operational agreements over the remaining track. The line consists mostly of the track built by the SP&S' Oregon Trunk railroad subsidiary, with a short portion of UP's OWRR&N track. Since 1996, BNSF and UP jointly operate the Oregon Trunk line.[4]

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[2] Oregon Rail Study, Appendix G, 2010

[3] http://www.leg.state.or.us/comm/commsrvs/background_briefs2010/briefs/Transportation/FreightPassengerRail.pdf

[4] Oregon Rail Study, 2010

Freight Railroad Classification

The North American rail network is an integrated system comprised of over 500 carriers, ranging in size and geographic scope. Railroads are commonly classified into three categories using schemes developed by the Surface Transportation Board (STB) and the Association of American Railroads (AAR). The two schemes differ in that the STB's definition is purely based on operating revenues, while the AAR also takes into account miles of railroad and type of operation. For this report the AAR definitions will be used.

The AAR classifies railroads based on both annual operating revenue and mileage as follows[5]:

- **Class I Railroad** – with annual operating revenues in excess of $433.2 million in 2011 dollars. (Definition same as that given by the STB). Six out of seven Class I railroads operate west of the Mississippi River, of which the BNSF and the UP are the two largest.
- **Regional Railroad** – A non-Class I line-haul railroad that has annual revenues of at least $40 million in 2009 dollars, or that operates at least 350 miles of road and revenues of at least $20 million in 2009 dollars. Also sometimes referred to as Class II railroads, there is one operating in Oregon at present.
- **Local Railroad** - A railroad which is neither a Class I nor a Regional Railroad, and which is engaged primarily in line-haul[6] service. Commonly referred to as a Class III or short line railroad.
- **Switching & Terminal Railroad –** A non-Class I railroad engaged primarily in switching and/or terminal services for other railroads, irrespective of gross revenues. Local and switching and terminal railroads are typically grouped together with short lines.

In addition to grouping carriers by size and revenue, it is also useful to draw distinctions by type of ownership. The different forms of ownership are as follows:

- **Class I Parent(s)** – Typically a switching or terminal railroad that is owned by one or more Class I railroads.
- **Industrial** – A railroad established to serve a specific industry. Examples include logging roads in Oregon and Washington that were built to carry

[5] AAR website on Industry Information; https://www.aar.org/aboutus/Pages/Industry-Information.aspx (last accessed on January 18, 2013)

[6] Line-haul movement is the long-haul rail portion of a trip between the originating and terminating intermodal yards. On either end of the line-haul is the local dray to and from the actual shipper or receiver of the goods.

logs to mills. In some instances industrial railroads provide service to other unrelated firms, in which case they are classified as common carriers.

- **Holding Company** – Small railroads are often owned by firms that own multiple properties. The majority of the 500 plus short lines that exist in the U.S. are owned by holding companies, of which prominent examples include Genesee & Wyoming, Watco, OmniTrax, and Anacostia and Pacific.
- **Public** - This category consists of railroads operated by public entities such as states, counties, and municipalities, as well as the federal government (typically for military purposes).
- **Independent** - A railroad that is not owned by any of the categories listed previously.

Table 2.1 indicates the classification of railroads in Oregon by type and parent company, along with information regarding route miles and operating revenue. Currently there are 23 freight railroads in Oregon, of which one is currently inactive, the Longview, Portland & Northern Railway (LPN)[7]. Out of the 22 active railroads, the two Class I railroads UP and BNSF are the largest. Combined, these two carriers own about 1,142 miles, 47 percent of total rail mileage within Oregon. Figure 2.1 provides an overview of all active rail lines in Oregon. In addition to owned mileage, some railroads also operate over tracks owned by other railroads on the basis of trackage rights agreements.[8] Under such arrangements, UP operates on about 205 additional route miles, while BNSF operates over approximately 106 additional route miles.

As Table 2.1 further shows, most of the remaining non-Class I railroads are independent or belong to holding companies. Three are industry-owned (Hampton Railway and Klamath Northern Railway, and Longview Portland & Northern), and five are publicly-owned (City of Prineville Railway, Wallowa Union, Port of Coos Bay, Port of Tillamook Bay and Lake Railway). The Portland Terminal Railroad is jointly owned by the UP and BNSF.

In addition to providing freight service, some non-Class I railroads in Oregon also host passenger excursion service, including Mount Hood Railroad and Oregon Coast Scenic Railroad on the Port of Tillamook Bay Railroad (only the western portion along the coast with stations at Rockaway Beach and Garibaldi). There are also other passenger excursion services including Astoria Riverfront

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[7] The LPN ceased operations in 1999, when its owner and main customer, an International Paper plant, closed.

[8] Rail carriers often negotiate rights for one carrier to use another carrier's tracks, with tenant carriers typically operating their own trains over the owning carrier's track. Trackage rights are usually the outcome of mergers, line sales, and strategies to mutually gain operational flexibility and capacity. The line's owner is compensated through a contractually set fee schedule.

Trolley, Eagle Cap Excursion Train, Sumpter Valley Railway, Washington Park and Zoo Railway – Oregon Zoo and Willamette Shore Trolley, but these do not operate on the freight rail system. All of Oregon's mainline passenger rail services consisting of Amtrak and Portland's West Side Express service utilize freight rail infrastructure.

Table 2.1 Classifications of Existing Freight Railroads in Oregon

Name of Railroad	Standard Carrier Alpha Code (SCAC)	Route Miles in Oregon[a]	AAR Classification	Ownership	Parent
BNSF Railway	BNSF	230	Class I	Class I	Berkshire Hathaway Inc.
Union Pacific Railroad	UP	881	Class I	Class I	
Albany & Eastern Railroad Co.	AERC	72	Local	Independent	
Central Oregon & Pacific Railroad	CORP	247	Local	Holding Company	Genesee & Wyoming Inc
City of Prineville Railway	COP	18	Local	Public	City of Prineville
Coos Bay Rail Link	CBR	133	Local	Public	Oregon International Port of Coos Bay
Hampton Railway, Inc.	HLSC	5	Local	Industry	Hampton Lumber Sales Co. – Willamina
Idaho Northern & Pacific Railroad	INPR	20	Local	Holding Company	Rio Grande Pacific Corp.
Klamath Northern Railway Co.	KNOR	11	Local	Industry	International Forest Products Ltd.
Lake Railway (LRY LLC)	LRY	15	Local	Public	Lake County
Longview Portland & Northern Railway	LPN	3.3 (Inactive)	Local	Industry	International Paper Co.
Mount Hood Railroad Co.	MH	21	Local	Holding Company	Iowa Pacific Industries
Oregon Pacific Railroad Co.	OPR	13	Switching & Terminal	Independent	
Palouse River & Coulee City Railroad[b]	PCC	32	Local	Holding Company	Watco Companies
Peninsula Terminal Co.	PT	1.0	Switching & Terminal	Independent	
Port of Tillamook Bay Railroad	POTB	84	Switching & Terminal	Public	Port of Tillamook Bay
Portland & Western Railroad	PNWR	447	Regional (Jointly with WPRR)	Holding Company	Genesee & Wyoming Inc.

Name of Railroad	Standard Carrier Alpha Code (SCAC)	Route Miles in Oregon[a]	AAR Classification	Ownership	Parent
Portland Terminal Railroad Co.	PTRC	0.5	Switching & Terminal	Class I	BNSF and UP
Rogue Valley Terminal Railroad[c]	RVT	12	Switching & Terminal	Independent	CCT Rail System Corp.
Wallowa Union Railroad	WURR	63	Local	Public	Wallowa & Union Counties
Willamette & Pacific Railroad	WPRR	Mileage included in PNWR	Regional (Jointly with PNWR)	Holding Company	Genesee & Wyoming Inc.
Willamette Valley Railway Co.	WVR	33	Local	Independent	
Wyoming & Colorado Railroad	WYCO	25	Local	Holding Company	Western Group
Class I Railroad		**1,111**			
Non - Class I Railroad		**1,258**			
TOTAL		**2,369**			

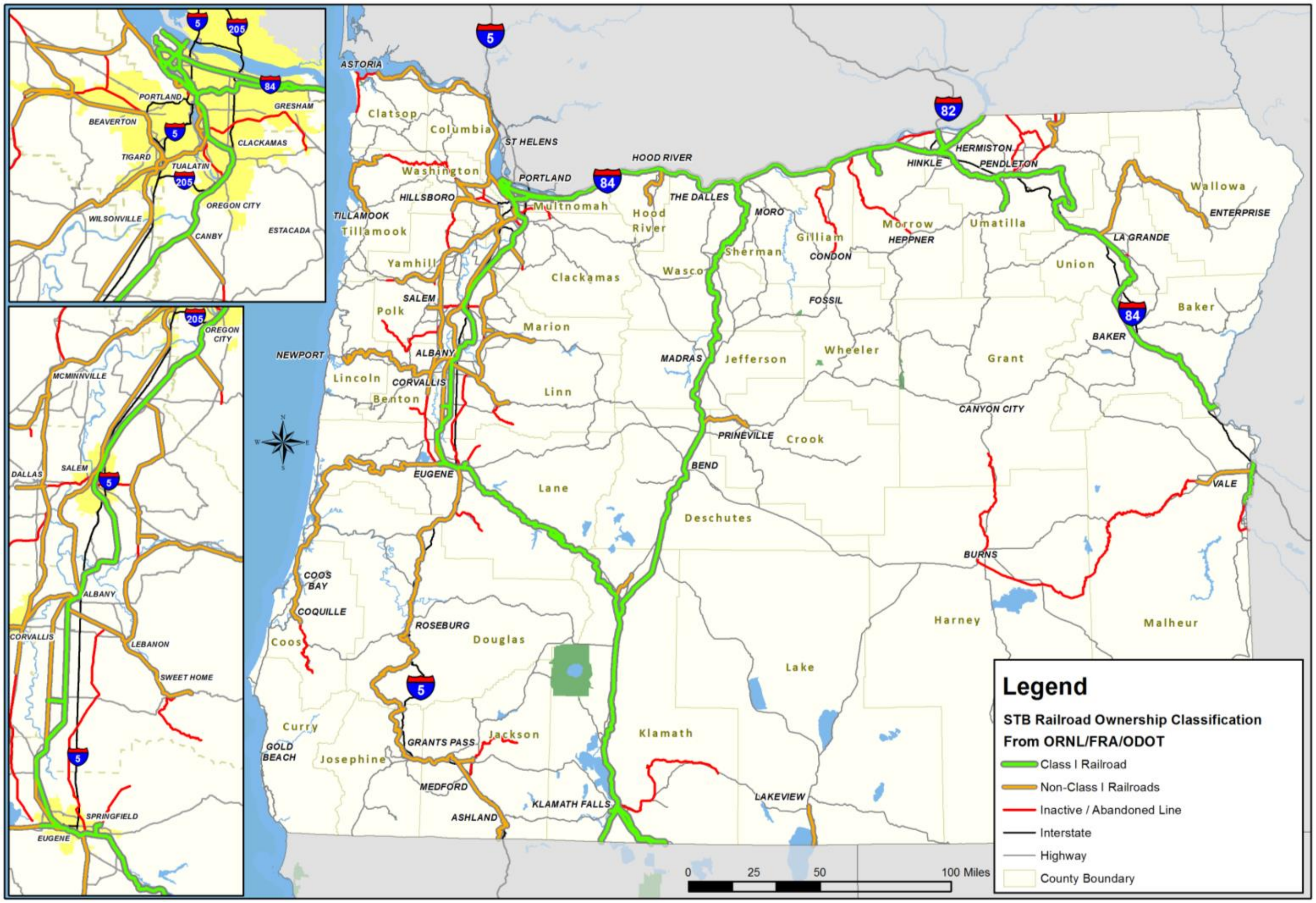
Source: 2011 Surface Transportation Board Annual Reports for BNSF and UP; 2011 U.S. Securities and Exchange Commission Form 10-K Filings for BNSF and UP; Oregon Rail Study: Appendix A Oregon Freight Rail System, Oregon Department of Transportation - Rail Division, 2011; Association of American Railroads State Facts – Oregon, 2010, Cambridge Systematics edits of ODOT Railroad GIS Data.

[a] Route miles are miles of track not including portions of second or higher mainline tracks, sidings, and yard trackage. Data shown for route miles comes from Cambridge Systematics edits of the ODOT GIS layer. All information are verified and updated to current year (2013).

[b] The Palouse River & Coulee City Railroad has main operations in Washington, however, there is a portion that terminates in Weston, OR from Walla Walla, WA.

[c] Formerly the WCTU Railway Co., a subsidiary of Marmon Transportation Services L.L.C, a Berkshire Hathaway Inc company. The Surface Transportation Board had required Marmon to divest two short lines when Berkshire acquired BNSF Railway Co. in 2010. See *Progressive Railroading*, 4/1/2013, and https://www.railinc.com/rportal/alf_docs/MergersAcq/RVT9000.pdf.

Figure 2.1 Overview of Railroads in Oregon



Source: Oak Ridge National Laboratory Rail GIS Data, FRA, ODOT

Class I Railroads

Class I railroads BNSF and UP operate approximately 47 percent of all rail line mileage in Oregon, including all of the main arteries serving the state. This section provides an overview of their history, infrastructure and operating characteristics.

Union Pacific Railroad

Omaha-based Union Pacific Railroad (UP) is North America's largest railroad by many metrics. Celebrating its 150th anniversary in 2012, UP operated the most mileage at 31,900 route miles in 23 states, handled 9.05 million carload units and generated $20.9 billion in revenues, all with a workforce of almost 46,000 employees.[9]

UP gained entry to Oregon in 1896 when it acquired a majority stake of the Oregon Railroad & Navigation Co. (OR&N). The OR&N operated a 1,143-mile network running east from Portland to northeastern Oregon, Washington and Idaho. Another UP controlled carrier, the Oregon Short Line (OSL) connected with OR&N at Huntington, Oregon, thereby establishing a transcontinental link that was fully controlled by the UP between Portland and the Midwest.

For over a century, the third major carrier serving Oregon was the Southern Pacific (SP). From its headquarters in California's Bay Area, the SP initially reached Oregon from the south over Siskiyou Summit on a line completed in 1887 by the Oregon and California Railroad. UP acquired the SP in 1996, and with this acquisition, the UP became the dominant railroad in Oregon in terms of route miles.

UP's present day network, shown in Figure 2.2, serving Oregon consists of two primary lines. Both are predominantly single track, of which one follows the historic route of the Oregon Trail into the state, crossing over the Blue Mountains in eastern Oregon, winding along the south bank of the Columbia River to Portland.[10] The other is the former SP route that connects Portland, Eugene and Klamath Falls, and is used by through trains from Washington and Canada to destinations in California and the Southwest.[11]

As shown in Table 2.2, in 2011 UP operated 881 miles of track in Oregon, with a staff of 1,592, and a $126.6 million payroll. In that year, UP originated more than 175,300 carloads in the state, and terminated more than 260,700 carloads. Top inbound commodities include mixed freight handled in containers and trailers,

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9 http://www.up.com/investors/attachments/secfiling/2013/upc10k_020813.pdf, accessed May 8, 2013.

10 UP Oregon Fact Sheet, 2011

11 Oregon Rail Study, 2010

recyclables/waste, fertilizers, soda ash and coal. Top outbound commodities were dominated by mixed freight in intermodal service, and lumber/building materials. The commodity flow analysis in Section 2.2 provides more detail on freight rail traffic in Oregon.

BNSF Railway

The second largest Class I railroad in North America, BNSF was formed through the combination of some 390 railroads over more than 150 years. BNSF's direct descendants in the Northwest consist of the two northern transcontinental railroads - Great Northern and Northern Pacific - along with the jointly owned Spokane Portland, and Seattle. These carriers all became part of the Burlington Northern (BN) in 1970, which later combined with the Atchison Topeka and Santa Fe in 1995 to become the present day BNSF. In 2010, BNSF was acquired by Warren Buffet's Berkshire Hathaway at a total cost of $44 billion, including assumption of debt and previous investments.[12] With this transaction, the BNSF Railway Company effectively became a privately held firm, a unique situation among North America's seven Class I railroads.

Today's BNSF owns approximately 23,000 route miles of track, and operates over another 9,500 route miles through trackage rights. In 2012, BNSF generated over $20.5 billion in revenue from 9.66 million carloads/units of traffic. Headquartered in Ft. Worth, the firm employs over 41,000 in 28 states and two Canadian provinces.[13]

BNSF is the third largest rail operator in Oregon in terms of miles of road operated, with 264 miles of owned track, and 151 miles of trackage rights. In addition to serving the Portland region, approximately 313 miles comprise a north-south corridor that forms part of BNSF's through route along the West Coast between California's Central Valley and the Pacific Northwest. Often referred to as the Oregon Trunk Line, the Oregon portion links Sherman (Wishram, Washington) on the Columbia River with Bend, Chemult, and Klamath Falls to Malin on Oregon's southern border with California. Although beyond Oregon's borders, critical to BNSF's service to the State is its mainline along the north bank of the Columbia River between Pasco, Wallula, Wishram and Vancouver, Washington.

In 2010 BNSF employed 290 people in Oregon, with a payroll of $19.5 million. Approximately 79,720 carloads of freight originated in Oregon, while 157,210 carloads terminated. Top inbound commodities consisted of mixed freight

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12 http://www.marketwatch.com/story/berkshire-buys-burlington-northern-2009-11-03

13 http://www.sec.gov/Archives/edgar/data/15511/000001551113000005/bnsfrailway-12312012x10k.htm

moving in intermodal service, agriculture products, industrial products and coal. Top outbound commodities were dominated by mixed freight and industrial products. The commodity flow analysis in Section 2.2 provides more detail on commodity movement. Almost all of BNSF's network in Oregon, shown in Figure 2.4, consists of single track mainline.

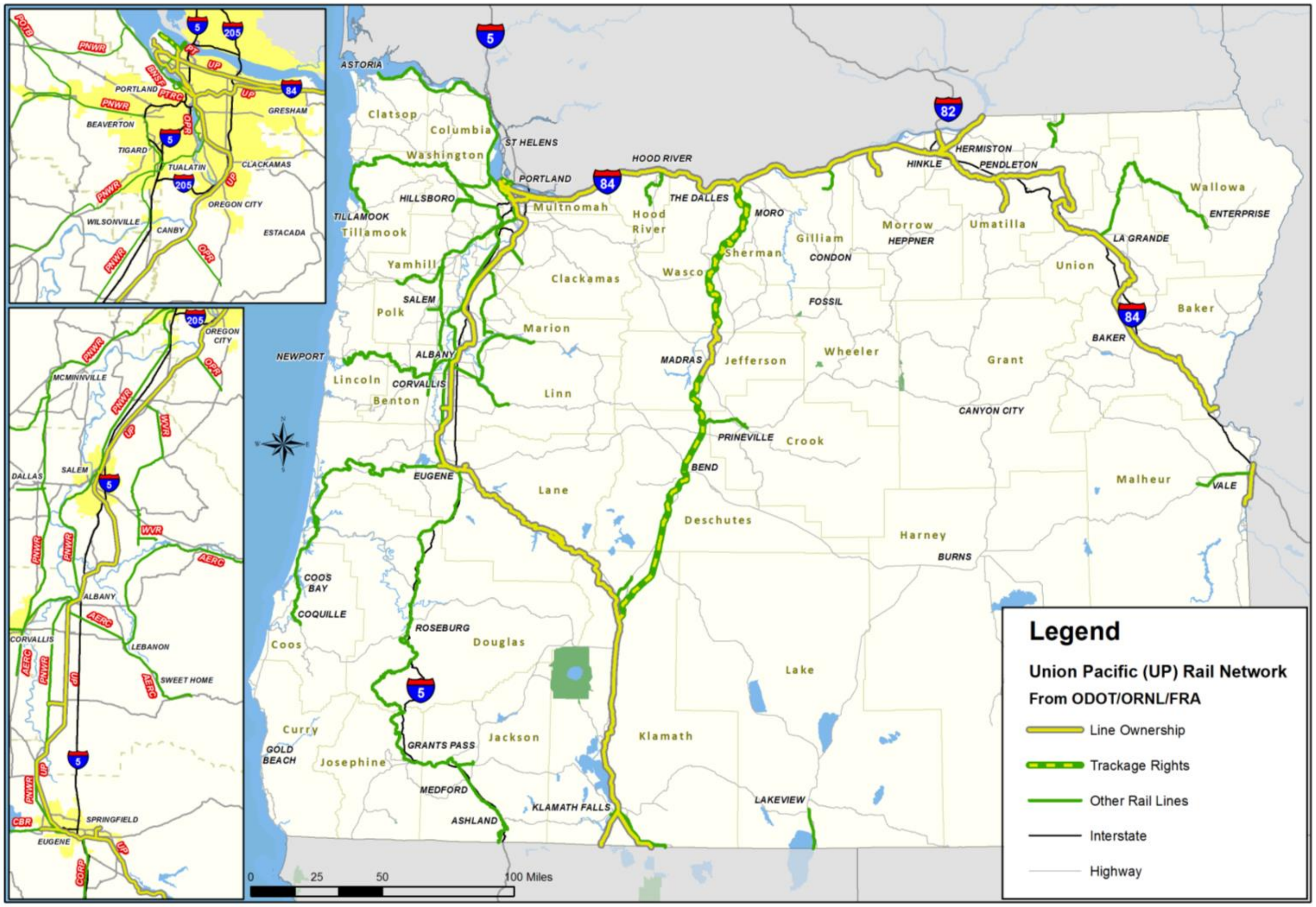
Table 2.2 Class I Railroad Operating Characteristics in Oregon

Name	Employees	Payroll (Millions of Dollars)	Miles Operated[a]	Originating Carloads	Terminating Carloads
UP	1,592	$126.6	877.8	175,303	260,701
BNSF	290	$19.5	264.4	79,726	157,213

Source: UP statistics from UP Factsheet for Oregon, 2011; BNSF statistics from BNSF Factsheet for Oregon, 2010.

[a] Mileage operated are the same as shown in Table 2.1, collected by Cambridge Systematics using ODOT GIS data.

Figure 2.2 Map of Union Pacific Rail System in Oregon

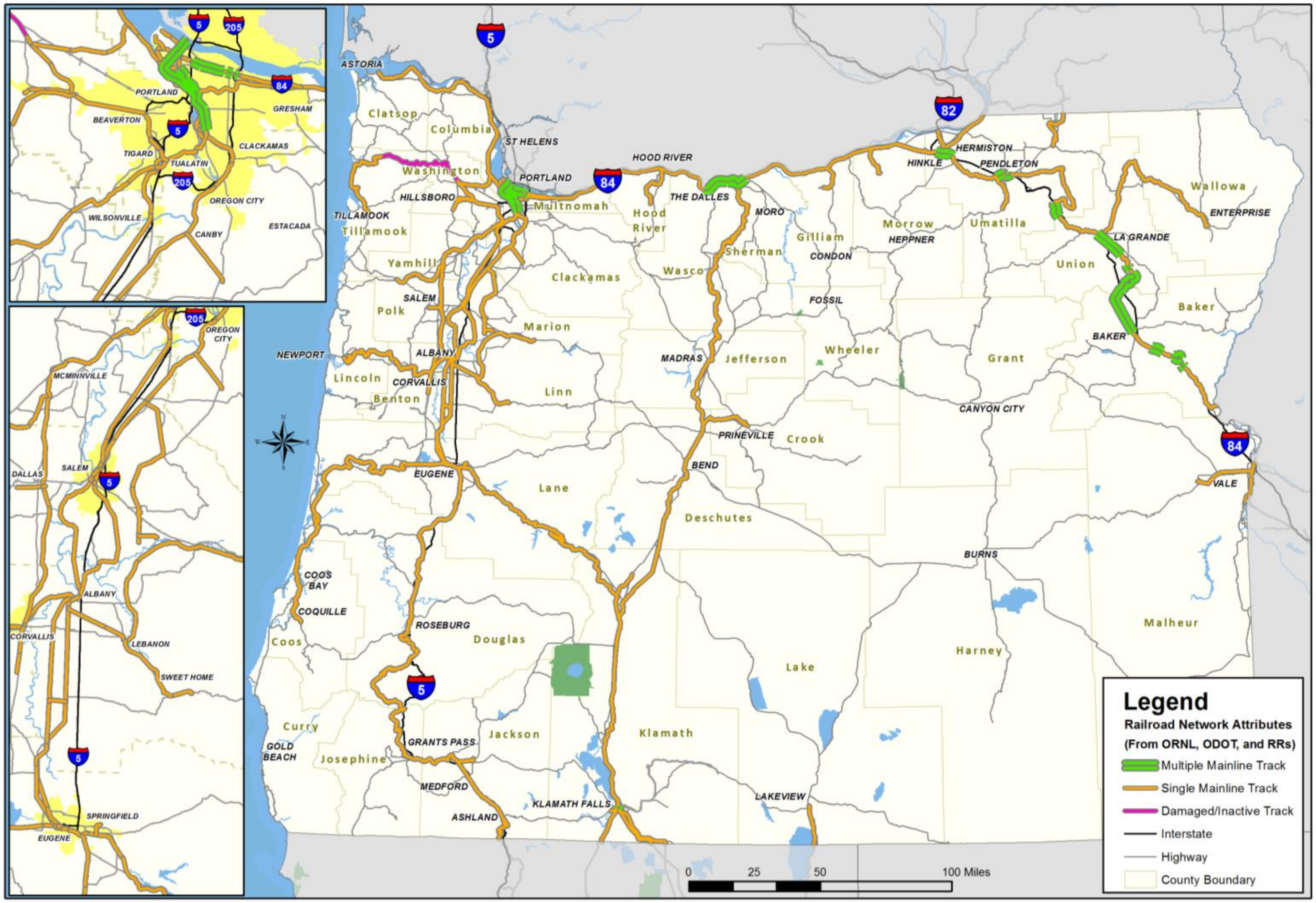


Source: Oak Ridge National Laboratory Rail GIS Data, FRA, ODOT

Figure 2.3 Map of BNSF Railway System in Oregon

Source: Oak Ridge National Laboratory Rail GIS Data, FRA, ODOT

Figure 2.4 Mainline Track



Source: Oak Ridge National Laboratory Rail GIS Data, FRA, ODOT

UP's and BNSF's Competitive Posture in Oregon and the Pacific Northwest

The following narrative is included to provide context to rail operations in Oregon and the Pacific Northwest. This is publicly available information, and the presentation is not intended to favor one rail carrier over the other.

As the two Class I railroads that dominate rail service in the west, the nature of UP and BNSF's presence in Oregon and the Pacific Northwest should be considered in that context. In many respects, BNSF's and UP's operations in Oregon are the inverse of those in Washington. With UP's 1996 acquisition of SP, UP handles the lion's share of rail traffic in Oregon, while BNSF does the same in Washington. Likewise, BNSF's transcontinental route to the east is through Washington, while UP's is through Oregon. Both routes are primarily single track, but BNSF has three routes connecting eastern Washington with the Pacific coast, whereas UP operates a single route from eastern Oregon. In addition to their respective lines through the Columbia River gorge, BNSF has Stampede Pass and Stevens Pass across Washington's Cascade mountain range. Although these latter two routes primarily serve the Puget Sound region, they offer operational flexibility and capacity to BNSF that is not available to UP. In 2012, the multiple routes allowed BNSF to implement directional operation of bulk traffic over the Columbia Gorge and Stampede Pass routes, utilizing the former for westbound loaded trains, and the latter for eastbound empties. This strategy provided increased capacity to BNSF throughout the Pacific Northwest without substantial capital investment.[14]

Prior to the absorption of the SP, UP's competitive position in Oregon and the Pacific Northwest was secondary to the BNSF predecessor railroads. This was most evident in its access to the major ports in the Pacific Northwest. While UP only had - and still only has - direct access to the Port of Portland, BN directly served all of the leading Pacific Northwest ports, including Seattle, Tacoma, and Vancouver, British Columbia, in addition to Portland. UP's entry to the Puget Sound ports relies on BNSF trackage rights from Portland.

UP also faces impediments in accessing some of the region's smaller ports on the Pacific Coast. Access to these ports, at locations like Astoria and Coos Bay, Oregon or Grays Harbor, Washington, require the use of non-Class I line connections. These connections have their own revenue needs, thus placing pressure on rates and potentially making them less competitive than a port served directly by a single line haul. Furthermore, over the years, the often tight finances of the serving non-Class I lines have limited the development potential, particularly in Oregon.

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[14] Kelley, *Three-Sided Traffic Solution: BNSF Routes More Trains Via Stampede Pass to Maximize Capacity in Washington State,* **Railway Age**, November, 2012, pp. 43-45.

BNSF's geographic position in the Pacific Northwest has given it a strong advantage over UP in the handling of intermodal traffic as well bulk commodities in international trade. In Oregon, the acquisition of the SP did little to change that balance, but it did give the UP a strong carload traffic base in the Willamette Valley, along with that of connecting non-Class I lines that had once been part of the former SP. These have provided UP with an expanded forest products and agricultural traffic base, which continues to be largely a carload market. UP's market for bulk products is primarily the Portland region, where its access to the Ports of Portland and Vancouver, WA is directly competitive with BNSF.

While BNSF's access from the east is arguably superior to UP's, the latter offers better connectivity and service along the I-5 corridor in Oregon. UP handles the majority of traffic along this route, a result of superior capacity, faster speeds, and less circuity than BNSF. Not unlike UP's competitive disadvantage in Washington, BNSF faces a further weakness on this route due to its extensive dependence on trackage rights over the UP in southern Oregon and California.

The reliance on trackage rights by both UP and BNSF along the West Coast reflects the degree to which the two dominant western carriers both compete and cooperate. With few exceptions, both BNSF and UP serve most of the major metropolitan areas in the western U.S. While they aggressively seek to exploit their respective advantages in the major lanes, in regions where one or the other carrier dominates and traffic volumes are less robust, they tend to be less competitive. This has been a particular concern in some regions where, prior to the most recent mergers, rail service was only available from one or the other predecessor railroads, leaving some shippers "captive."

The Staggers Rail Act of 1980 substantively deregulated the rail industry, and provided the foundation that helped the rail industry achieve its present economic vitality. A key provision of the Act was that a shipper bears the burden for proving that a railroad is charging excessive rates. Some shippers have viewed the bar as being excessively high, and for many years few challenges filed by shippers with the STB were successful. The result has been increasing pressure by some shipper groups to substantially modify the Staggers Act. In recent years, both chambers of Congress — including the current one — have introduced legislation and conducted well-publicized hearings. While these efforts have not borne fruit, the STB has responded to these pressures by making changes to its procedures to make them more attuned towards shippers. This more "shipper-friendly" attitude has also been evident in several recent decisions, which went in favor of shippers, that only a short time ago would likely have favored the railroads.

At present, the STB has several proceedings underway that could result in significant changes to the economic regulation of the rail industry. These include:

- Recent reviews of competition in the rail industry (Ex Parte 705);

- A proposal to impose access to industries served by a single carrier where another is nearby (Ex Parte 711) that is being advanced by the National Industrial Traffic League (NITL), a major shipper organization; and,
- Reforms to rate regulation (Ex Parte 715).

Finally, the railroads' continued financial improvement may soon place them in the category of being "revenue adequate," as defined by the STB. Once they have achieved this level, then they will become "long-term revenue adequate," which could trigger more stringent economic regulation. The Staggers Act does not spell out the changes that will take effect in this situation, and thus will likely be the subject of lengthy STB proceedings or perhaps even congressional intervention.

How potential changes arising from these proceedings or legislative action may impact the financial performance of the railroad industry is not known, but they are unlikely to improve them.

Railyards and Intermodal Connections

Rail yards and terminals form an integral component of every rail network. Yards allow the efficient collection and distribution of traffic between origins and destinations throughout the network, while terminals provide access to the network from other modes. There are several types of yards and terminals, each designed for a specific purpose. These facilities include:

- **Carload facilities**, which support traditional loose car services. As a car travels across the rail network from origin to destination, it goes through a series of rail yards, where trains are separated into single railcars or blocks of cars and sorted by subsequent destination, which could be a yard thousands of miles away, or a train serving nearby industry. There are several types of carload yards, of which the most common are **system**, **regional**, and **industry** yards. System yards process high volumes of traffic over a larger territory, and assemble complete trains destined throughout a system and even connecting railroads. Regional yards classify traffic, processing carloads originating or terminating within a region and assembling trains destined for other regions. Industry yards are established to distribute, collect and temporarily hold cars for nearby customers.
- **Bulk transfer facilities** facilitate the transloading of bulk goods such as grain, plastic pellets, and liquid chemicals between rail and other modes, typically highway and water, and entail transferring the commodity from one mode-specific vehicle to another using pumps, conveyor lifts, and vacuum systems.
- **Specialized terminals** such automobile loading/unloading facilities facilitate the transfer of commodities requiring special handing between rail and other modes.
- **Intermodal terminals** handle the transfer of trailers or containers between highway, rail, and water. Ships carrying international and domestic

containers can be loaded directly onto railcars at on-dock intermodal facilities, or containers can be drayed by trucks and then loaded onto railcars at near-dock or off-dock facilities.

Oregon is home to one or more yards and terminals of each of these types. Over the years, BNSF and UP has concentrated their operations in fewer locations than was once the case. This consolidation has occurred as a result of operational efficiency, technological improvements and the railroad industry's evolving traffic mix. For example, declining carload traffic and increased unit train volumes, which bypass intermediate yards, has reduced the need for carload service yards. Several yards across the state now primarily serve as storage facilities where intact trains can be held while other activities occupy the mainline or terminals.

Today, the Pacific Northwest is served by two primary system yards, Hinkle on the UP, and Pasco, Washington on the BNSF. For example, a train coming from Kansas City to the Pacific Northwest with cars destined for Portland, Seattle and Eugene will be sorted at Hinkle and combined with the traffic from other trains into new sections destined for the three respective cities.[15]

Table 2.3 lists the key railyards and terminals in Oregon, and Figure 2.5 displays these yards in graphical form, along with other railyards (with the exception of Tigard and Millersburg/Albany yards, which are included in Table 2.3). Intermodal terminals and key carload facilities in Oregon include:

- **Hinkle Yard** – Hinkle Yard is UP's primary system yard and locomotive service and repair facility in the Pacific Northwest. Initially constructed in 1951 and expanded in 1998, the facility was designed to fulfill the service and repair needs of UP's Pacific Northwest corridor. According to UP, the mechanical facility services about 90 locomotives a day.[16]
- **Guilds Lake Yard** – Located in northwest Portland and operated by the Portland Terminal Railroad Company (PTRC), Guilds Lake Yard serves both intermodal and carload traffic. PTRC performs industry switching for UP and BNSF at nearby industries, and is governed under an operating agreement.[17] Lake Yard is BNSF's primary intermodal terminal in the Portland region.
- **Brooklyn Yard** – Located in southeast Portland, this yard has been converted to become UP's intermodal facility in the Portland region. A former mixed use Southern Pacific yard, Brooklyn now serves as UP's primary intermodal terminal.

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15 Oregon Rail Study, 2010

16 http://www.up.com/aboutup/facilities/hinkle/index.htm

17 http://www.up.com/customers/short line/lines/ptr.shtml

- **Terminal 6 at Port of Portland** – In the growing intermodal market, on-dock intermodal terminals at port locations are especially important to maintaining the competitive advantage of a port. The Port of Portland has one intermodal container terminal (Terminal 6) that has on-dock capacity for three trains, as well as efficient access to BNSF and UP.[18]

Table 2.3 Major Railyards and Terminals in Oregon

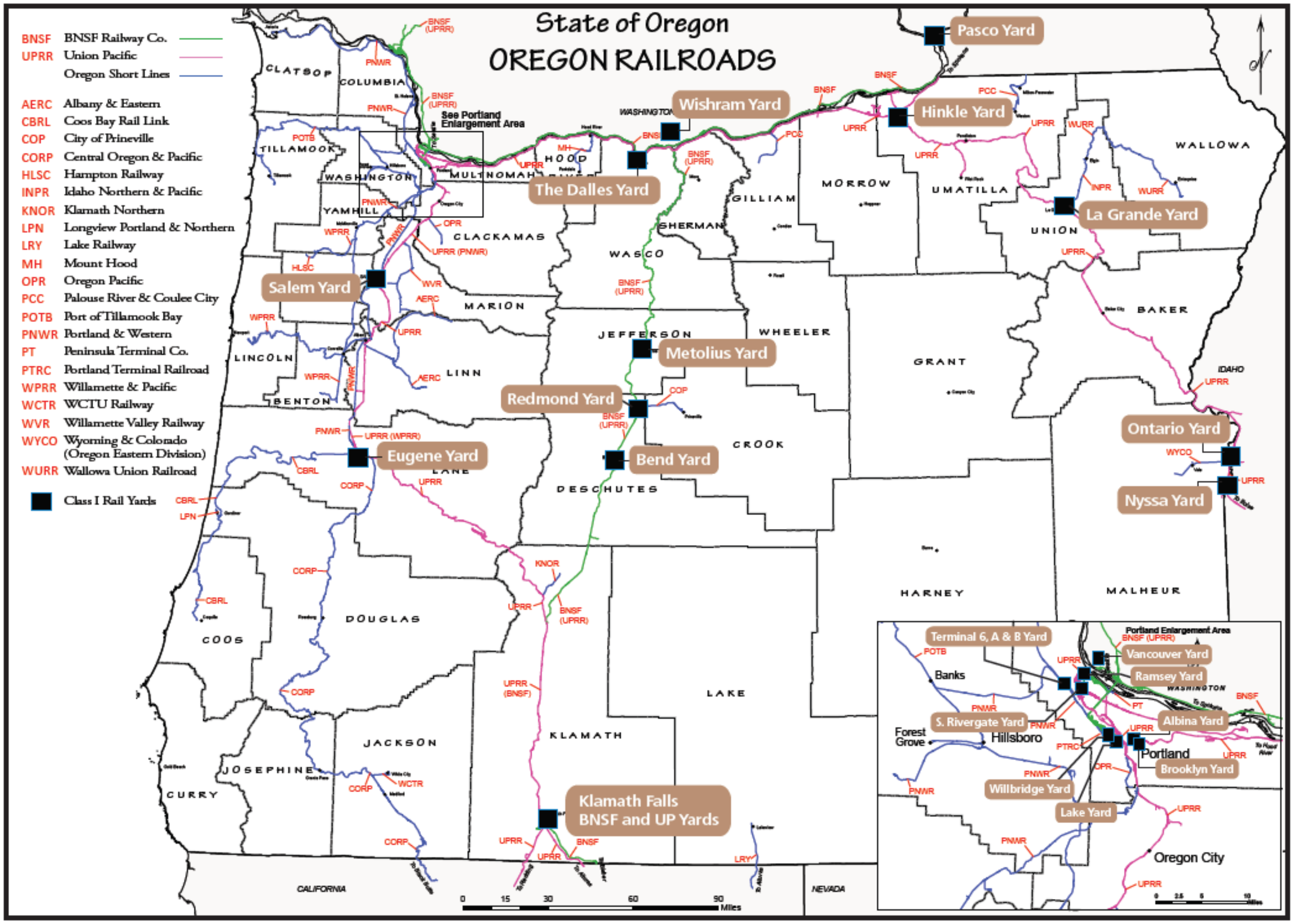
Railroad	Name	Location	Type	Description
BNSF/ UP	Klamath Falls Yard	Klamath Falls	Switching	Switching, storing rail cars, and locomotive repair (BNSF and UP have adjacent yards)
BNSF	Guilds Lake Yard	Portland	Intermodal and carload	Regional carload yard and intermodal terminal for BNSF
BNSF/ UP	Terminal 6 Intermodal Yard	Port of Portland	On-Dock Intermodal	On dock terminal with connection to BNSF and UP mainlines
BNSF	Willbridge Yard	Portland	Carload	Chemical and Petroleum products
PNWR[1]	Albany/Millersbur g Yard	Albany	Switching	Switching, transloading and storing rail cars (BNSF, UP)
PNWR[1]	Tigard Yard	Tigard	Switching	Switching, transloading and storing rail cars (UP)
UP	Albina Yard	Port of Portland	Carload	Regional carload yard and locomotive servicing facility
UP	Barnes Yard	Portland	Carload	Support Port of Portland and Rivergate industrial area
UP	Brooklyn Yard	Portland	Intermodal	UP Portland intermodal traffic
UP	Hinkle Yard	Hinkle	Carload/Service	UP's Pacific Northwest system yard for staging transcontinental traffic

Source: Oregon Rail Study, 2010; Port of Portland Website; BNSF and UP Oregon Factsheets; Web Searches

[1] Not shown in Figure 2.5

[18] http://qa.portofportland.com/pdfpop/Cntnr_Intrmdal_Rail_Brochure.pdf

Figure 2.5 Railyards and Terminals in Oregon



Source: Oregon Rail Study, 2010

Non-Class I Line Railroads

While the Class I mainline railroads provide the primary arteries for the movement of goods and passengers throughout the state, non-Class I line railroads provide important collector/distributor services for the larger railroads and local rail services for rural shippers. In Oregon, non-Class I lines were originally built to support the forest and agrarian based economy. Beginning in the 1980s, many non-Class I line railroads were established when larger railroad companies sold off or leased less profitable portions of their systems. Today the non-Class I lines provide vital links to the national network and serve the state's forest product and agricultural industries that would otherwise be inaccessible by rail. As Figure 2.6 shows, most Oregon non-Class I lines are situated along the I-5 Corridor.

Table 2.4 provides a listing of non-Class I lines in Oregon with recent data on revenue and volume, along with an indication of at-risk segments. From the table it is evident that non-Class I line railroads vary greatly in length, revenue and carload volumes. In terms of mileage, the longest non-Class I line is the Portland & Western Railroad, which together with the Willamette & Pacific Railroad and the Central Oregon & Pacific Railroad, operate 56 percent of total non-Class I line mileage, and generate about 80 percent of total revenue. Also evident are great variations in revenue generated by non-Class I lines, ranging from approximately $100,000 to more than $20 million. In terms of revenue per mile, the highest ranked non-Class I line is the Peninsula Terminal Co. which provides transloading service in Portland. It is important to point out that high revenue does not mean high profit, since non-Class I lines often do not generate sufficient income to fully cover the cost of capital, and therefore renewal of their physical plant.[19] Revenue/mile is perhaps a better indicator of non-Class I line health, since the miles of track that must be maintained directly correlate with maintenance needs. Thus, higher revenue per mile offers the potential to reinvest a greater portion of revenues into the physical plant.

The At-Risk Segment information in Table 2.4 is described in the next section on Rail Line Abandonments.

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[19] Oregon Rail Study – Appendix A, 2010

Table 2.4 Oregon Non-Class I Railroad Characteristics (Ranked by Revenue), 2011

Name of Railroad	Route Miles	No. of Carloads	Revenue	Revenue/ Mile	% Total Non-Class I Line Revenue	At Risk Segments[a]
Portland & Western Railroad[1]	447	39,511	$20,348,641	$ 75,293	35%	Astoria District – no customer; Forest Grove District – Poor condition
Willamette & Pacific Railroad	Mileage included in PNWR	24,327	$13,300,020	-	23%	Bailey District – Abandoned in 2011; Dallas District – no customer
Central Oregon & Pacific Railroad	247	16,113	$13,184,446	$54,443	23%	Ashland to Montague, CA – pricing actions
Mount Hood Railroad Co.	21	448	$2,479,176	$117,496	4%	
Albany & Eastern Railroad Co.	72	3,011	$1,765,426	$24,622	3%	Sweet Home Branch – Little traffic
Peninsula Terminal Co.	1.0	2,694	$1,346,328	$1,346,328	2%	
Idaho Northern & Pacific Railroad	20	2,367	$1,005,900	$50,295	2%	
Palouse River & Coulee City Railroad	32	20,816	$923,528	$29,042	2%	
Lake Railway (LRY LLC) [2]	54 (15 in Oregon)	1,501	$826,459	$15,178	1%	Entire line – little traffic
Klamath Northern Railway Co.	11	2,354	$794,228	$72,865	1%	
Willamette Valley Railway Co.	33	923	$602,054	$18,244	1%	Entire line – little traffic
City of Prineville Railway	18	899	$436,287	$23,841	1%	
Wyoming & Colorado Railroad	25	1,156	$396,050	$16,034	1%	Entire line – little traffic
Oregon Pacific Railroad Co.	13	1,038	$355,680	$27,360	1%	Liberal to Mollala – track removed
Wallowa Union Railroad	63	-	$213,724	$3,371	0%	Entire line – little traffic
Rogue Valley Terminal Railroad[b]	12	557	$202,677	$16,613	0%	

Name of Railroad	Route Miles	No. of Carloads	Revenue	Revenue/ Mile	% Total Non-Class I Line Revenue	At Risk Segments[a]
Port of Tillamook Bay Railroad	84	362	$186,483	$2,223	0%	Part of line discontinued – storm damage
Coos Bay Rail Link	133	194	$101,847	$763	0%	Operation began 10/11/11
Portland Terminal Railroad Co.	0.5	N/A	$52,000	$104,000	0%	
Hampton Railway, Inc.	5	-	-	-	-	Entire Line – little traffic, operated by PNWR
Longview Portland & Northern Railway	3.3 (Inactive)	-	-	-	-	Dormant – no traffic
	1,258 (in Oregon)	**118,271**	**$58,520,954**	**$46,975**	**100%**	

Source: Oregon Department of Transportation – Rail Division, 2011 Oregon Short Line Ranking Data; At Risk Corridor Information from 2010 Oregon Rail Study

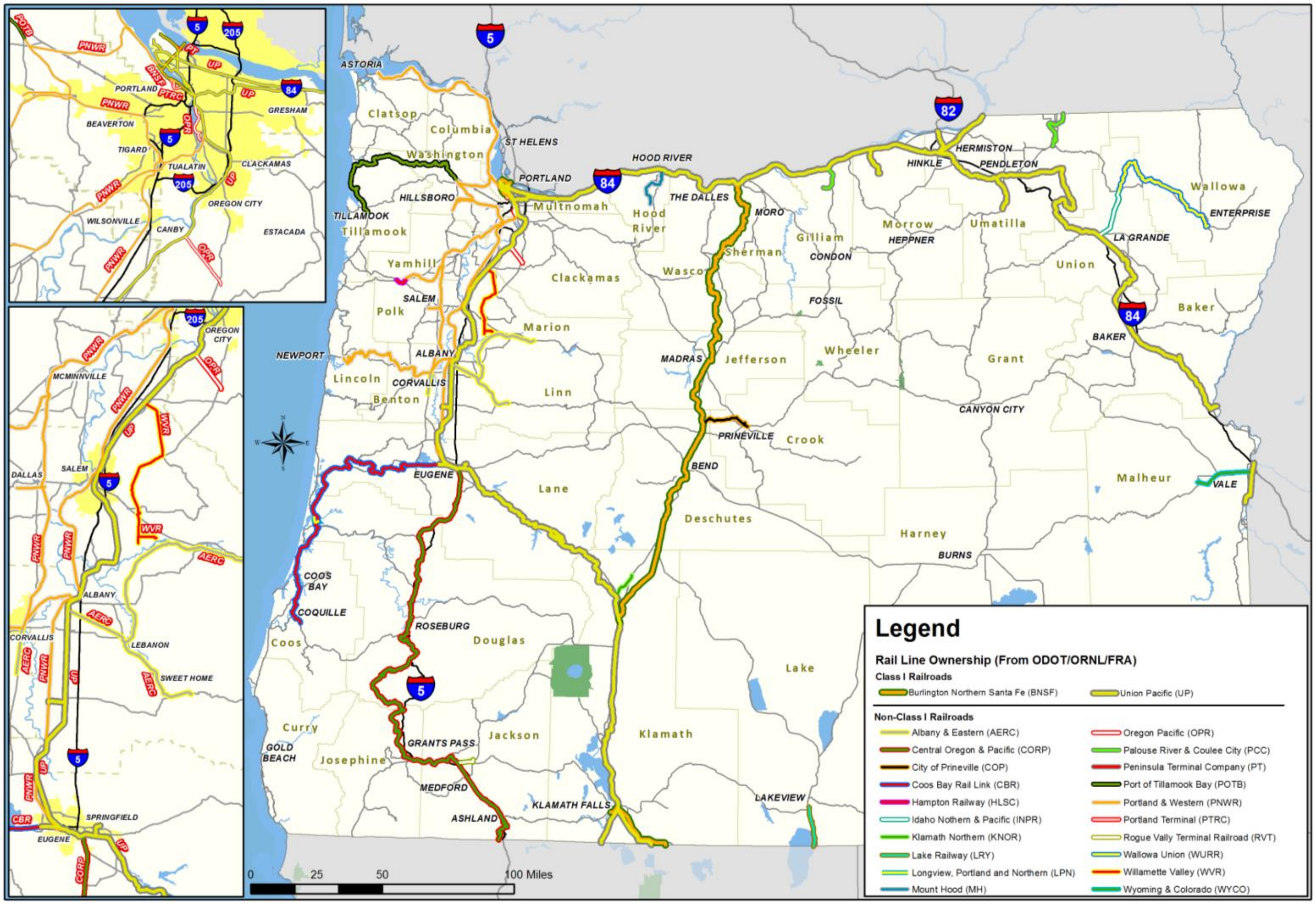
[a] At Risk Corridor Information from the 2010 Oregon Rail Study evaluates lines that were at-risk of abandonment as a result of recession. This table provides updated information since the 2010 study.

[b] The WCTU Railway recently changed its name to Rogue Valley Terminal Railroad Corp (RVT). In addition, the non-Class I line's holding company has been renamed CCT Rail System Corp. In December, RVTR Rail Holdings L.L.C. acquired the WCTU Railway from Berkshire Hathaway Inc. subsidiary Marmon Transportation Services L.L.C. The Surface Transportation Board had required Marmon to divest two short lines that Berkshire obtained in 2010 when it acquired BNSF Railway Co. *Progressive Railroading*, 4/1/2013

[1] Revenue/Mile for the Portland and Western is based on revenue of both the PNWR and WPRR, divided by the PNWR mileage (which includes WPRR mileage).

[2] Revenue/Mile for the Lake Railway is reported for the entire 55 mile system, even though only 15 miles are in Oregon.

Figure 2.6 Map of Non-Class I Line Rail System in Oregon



Source: Oak Ridge National Laboratory Rail GIS Data, FRA, ODOT

Rail Line Abandonments

In the wake of the Staggers Act, railroads sold some of their lines which had low traffic density in order to improve financial performance. While the most marginal lines were abandoned, many were sold or leased to non-Class I line operators. Subsequently, these operators either succeeded in improving the lines' financial performance through lower operating costs and improved service, or were eventually forced to cease operations. Thus, where abandonment applications were once primarily a Class I phenomenon, in recent years, a growing portion of line abandonments has been filed by non-Class I lines.

In Oregon, line abandonments have been driven by multiple factors, including high capital costs, lack of customer diversity, and the inability to tap into growing markets. Coupled with the recession of 2009, long term systemic deferred maintenance and operating deficits have left some non-Class I line corridors at-risk of closing.[20] Data obtained from the ODOT shows that abandonments peaked in the decade from 1990 to 2000, when more than 400 miles of rail line were abandoned. This is followed by the 1930s and the 1980s, where about 300 miles of lines were abandoned in each decade. In the most recent decade from 2000 to 2010, 126 miles were abandoned, with the largest single abandonment in terms of mileage being the Coos Bay branch line owned by the Central Oregon & Pacific (CORP). This line was later purchased by the Port of Coos Bay and subsequently re-opened for business as the Coos Bay Rail Link (CBR).

The abandonment and subsequent re-opening on the Coos Bay Branch line presents an opportunity to understand the importance of rail preservation. In 2007, the Coos Bay rail line was embargoed by CORP due to safety concerns in three tunnels, which resulted from a backlog of deferred maintenance. This forced shippers on the line to seek alternative transportation options. The Port of Coos Bay, acting in the interests of south coast communities, acquired the 111-mile line in 2009. Since then, it has secured $12.5 million in stimulus[21] funding, $11.8 million *Connect*Oregon[22] funding, and $13.5 million TIGER[23] II funding. The funds have allowed the Port to rehabilitate the tunnels and repair the track to

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[20] Oregon Rail Study, 2010

[21] This is the American Recovery and Reinvestment Act of 2009 (ARRA), passed by Congress to help generate jobs by providing $787 million to fund various programs.

[22] This is a funding program created by the Oregon legislature in 2005 to fund multimodal transportation projects.

[23] The Transportation Investment Generating Economic Recovery, or TIGER, is a discretionary grant program enacted in 2009 and continuing through 2012 that helps fund road, rail, transit and port projects that promise to achieve critical national objectives.

provide for efficient travel at 25 to 40 mph. Currently, the line is re-opened for operation as the Coos Bay Rail Link, serving several customers in the wood products, steel and dairy feeds business.[24]

The 2010 Oregon Rail Study also documented all at-risk non-Class I lines in Oregon, based on several factors including carloads per mile, revenues per mile and specific rail operator actions. This information is summarized in Table 2.4. Most lines that are at-risk of abandonment have little or no volumes on the lines, and no known planned change in strategy to attract additional business. In fact, one operator, the Willamette & Pacific, already abandoned one part of its line in 2011.

Existing Conditions and Operating Characteristics

Existing conditions and key operating characteristics of rail lines in Oregon were reviewed as part of this plan and include items such as traffic control systems, maximum speeds (track class), weight limits, double-stack capability, grade crossings safety, tunnels and bridge conditions. Together, these affect the performance of the rail system significantly and form the basis for existing and future infrastructure needs and improvements.

Mainline and siding tracks are another characteristic often looked at in a rail plan, as the number of tracks present directly correlates to the operating capacity of the rail system. For this report, since information regarding number of tracks forms an important basis for the needs assessment, it will be covered in more detail in a subsequent technical memorandum as part of the SRP. As a summary, the rail system in Oregon consists primarily of single track mainlines, as shown in Figure 2.4.

Traffic Control Systems

Systems for controlling rail traffic serve two primary purposes: preventing trains from colliding with each other, and efficiently managing the flow of traffic. There are several different types of systems which differ in their sophistication and complexity. The most basic method for controlling operations is Track Warrant Control (TWC), whereby trains crews are given permission to operate within specified segments by dispatchers via radio or electronically sent documents. TWC, which does not require any wayside equipment, is best suited for lines with low traffic volumes. More advanced control methods include Automatic Block Signaling (ABS), which controls train spacing by dividing a line into segments or blocks, with wayside (or in-cab) signals automatically indicating occupancy status of subsequent blocks, and Centralized Traffic Control (CTC), where a dispatcher remotely controls signals and sets train paths from a central location. Centralized traffic control systems improve efficiencies

[24] http://www.portofcoosbay.com/railrehab.htm

by consolidating operations management, improve safety, and increase capacity on lines with higher volumes.

In Oregon, the majority of Class I railroad mileage is operated under CTC, as Figure 2.7 shows. This includes the I-5 Corridor and the east-west corridor along Columbia River. The Oregon Trunk Line utilizes ABS and TWC control types; so does the Central Oregon & Pacific. The remaining non-Class I railroads utilize TWC or other methods of manual control.

In 2008 the railroad industry faced a new federal mandate to implement a new traffic control technology called Positive Train Control (PTC). As currently conceived, PTC is being implemented as an "overlay" over existing signal systems, for the express goals of preventing overspeed derailments and collisions between trains and other authorized track occupants. Mandated by the Railway Safety Improvement Act (RSIA) of 2008, PTC must be implemented by December 2015 on all lines handling regularly scheduled passenger trains or toxic-by-inhalation hazardous (TIH) materials, or lines with freight volumes that are greater than five million gross ton miles annually.

PTC implementation has proven to be expensive and technically challenging, and is unlikely to be completed within the mandated schedule. Costs are expected to far exceed the $10 billion estimated for nationwide implementation in 2008, which includes the installation of in-track PTC on almost 74,000 miles of rail infrastructure, as well as equipping more than 17,000 Class I locomotives with the necessary on-board hardware.[25] This topic will be discussed further in a future Technical Memorandum – *Needs Assessment.*

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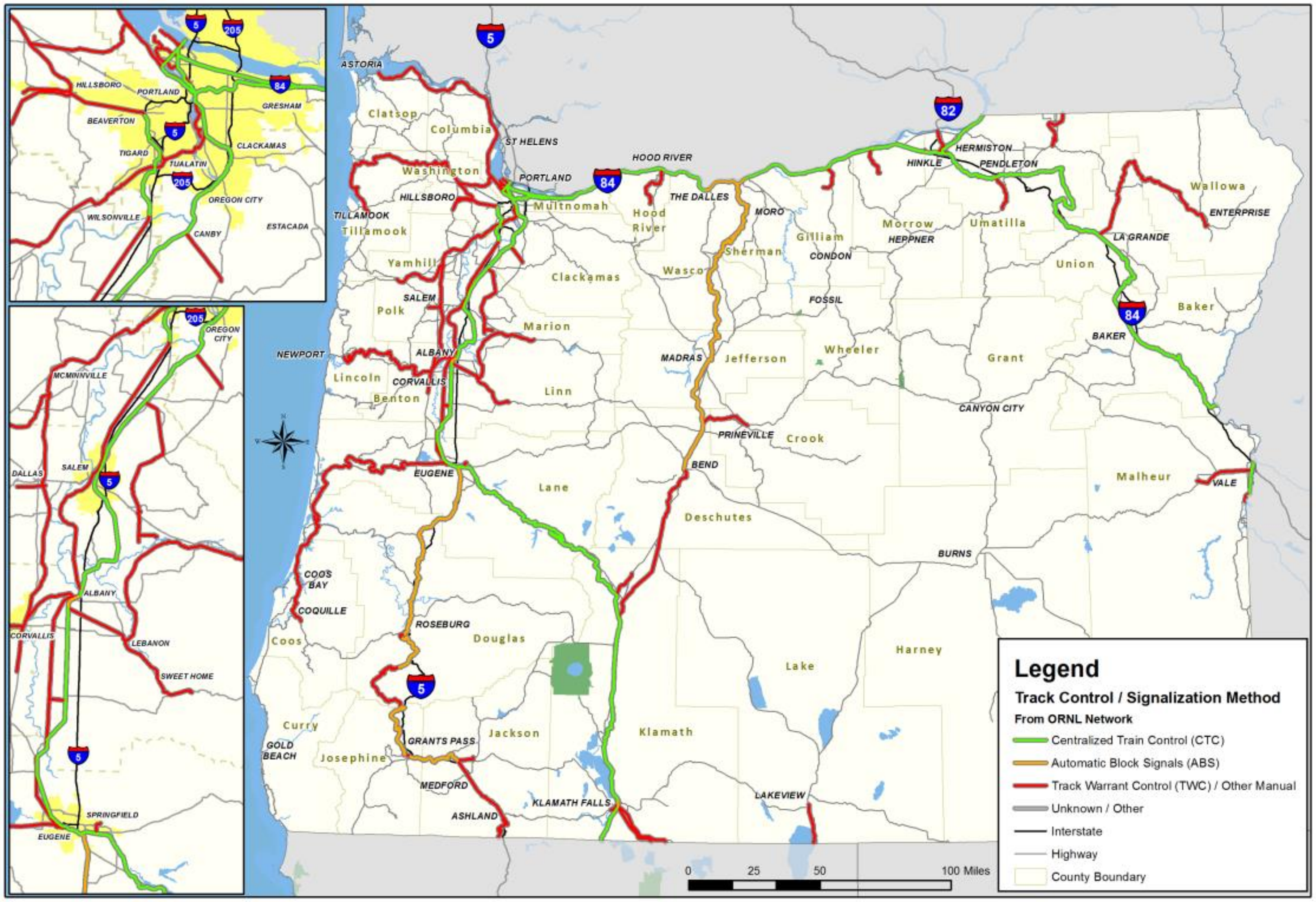
[25] http://www.progressiverailroading.com/ptc/news/FRA-to-Congress-Partial-rather-than-full-PTC-implementation-is-likely-by-2015s-end--32105#

Figure 2.7 Freight Railroad Signaling Systems



Source: Oak Ridge National Laboratory Rail GIS Data; ODOT

Weight Capacity and Track Speed

Throughout the history of the railroad industry, equipment has gained in size and capacity as guideway and rolling stock materials and engineering have advanced. In the 1970s, the industry moved from a standard 70-ton to 100-ton (263,000-pound) capacity car. This transition was hardly smooth, due to the deteriorated state of the infrastructure and insufficient analysis of potential impacts at the time. The next advance, which took place in the 1990s, raised the standard weight limit to 286,000 pounds ("286K").

The increase to 286,000 pounds was implemented following careful research by the Class I railroads on the associated benefits and costs. As a result, productivity gains substantially exceeded the cost increases to track maintenance that were incurred through the higher weights. In some instances, rail infrastructure needed to be upgraded to accommodate the added, constant weight. While the Class I railroads were able to complete these improvements at modest cost, for non-Class I lines the situation was often quite different, due to the deteriorated state and sometime functional obsolescence of their physical plants. As a result, many non-Class I lines restricted the heavier cars from their networks for safety concerns until improvements could be made. More recently, there has some movement to further increase the standard weight limit to 315,000 pounds ("315K"), but this higher weight is far from becoming an accepted standard. Increasing the weight limit to 315K requires considerably more costly improvements to infrastructure, particularly with bridges, than was the case with the increase to 286K.

Railroad operators issue restrictions on the maximum allowable gross weight rail cars can have on deficient lines. Issuing weight restrictions or embargoes, which are temporary restrictions that could be in effect for years, could force operators to make tough decisions regarding the types of investments to make and services to offer. If only certain rail cars can serve a community due to the presence of weight-restricted track, that service might be curtailed or become more expensive, requiring more rail cars of a lighter type than otherwise necessary. Conversely, upgrading to new track might allow for the operation of fewer, safer, larger, heavier cars, with more capacity, potentially increasing revenue and reducing operating costs.

Upgrading track to accommodate heavy-axle rail cars is not always the best solution for a railroad operator. Improving operations to handle 286K or 315K rail cars could hurt the bottom line over time if a non-Class I line extracts fees from the connecting Class I railroad based on car delivery, not tonnage. Thus, having a rail network capable of handling cars with the maximum allowable gross weight can have benefits, including long-term cost savings, improved safety, and more efficient railroad service, but it might prove to be expensive and potentially terminal for some non-Class I line operators.[26]

Starting in 2006, Oregon DOT has carried out regular analyses of the 286K capability of rail lines. As Table 2.5 shows, while all Class I mileage is capable of handling the current standard weight limit, only 78 percent of non-Class I line mileage is able to do so. This indicates a significant disadvantage for non-Class I lines that are unable to handle 286K. Figure 2.8 also shows the location of the rail lines unable to handle 286K cars, and these are non-Class I lines dispersed throughout the state. It is also cautioned that, although this survey reflects almost 84 percent of the rail route miles accepting 286K shipments in July 2006, one cannot conclude that 84 percent of the rail system is therefore adequate for handling such heavy rail cars. In fact, competitive market pressures are causing some carriers to move 286K cars over track considered too light for the task. The railroad either accepts the heavier cars or risks losing the business altogether.[27]

Better indicators of Oregon railroad health are miles of track in FRA Class 2 or better condition and miles laid with 110-pound or heavier rail[28]. FRA Track Class 2 means that that the maximum speed limit on the tracks is limited to 25 mph for freight, or 30 mph for passenger. Branch lines, secondary mainline, and many regional railroads fall into this class. It is commonly believed that this is the minimum speed needed for non-Class I lines to be competitive.[29] As shown in Table 2.5, about 35 percent of all non-Class I line miles are not up to FRA Class 2 standard, which translates to nearly 500 miles of line.

In addition, railroad track needs to be constructed with sufficiently heavy rail to withstand the stresses from higher weights and speeds in an economically efficient manner. A rail profile greater than 115 pounds/yard is commonly preferred to safely and economically support 286K operations in the long run. Table 2.5 shows that about 34 percent, or nearly 500 miles of the network in Oregon, is comprised of rail lighter than 110 pounds that must be replaced to create infrastructure adequate for safe and efficient hauling of 286K cars.

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26 Washington State 2010-2030 Freight Rail Plan, 2010

27 Oregon Department of Transportation Rail Division –286K Survey, 2006

28 Ibid.

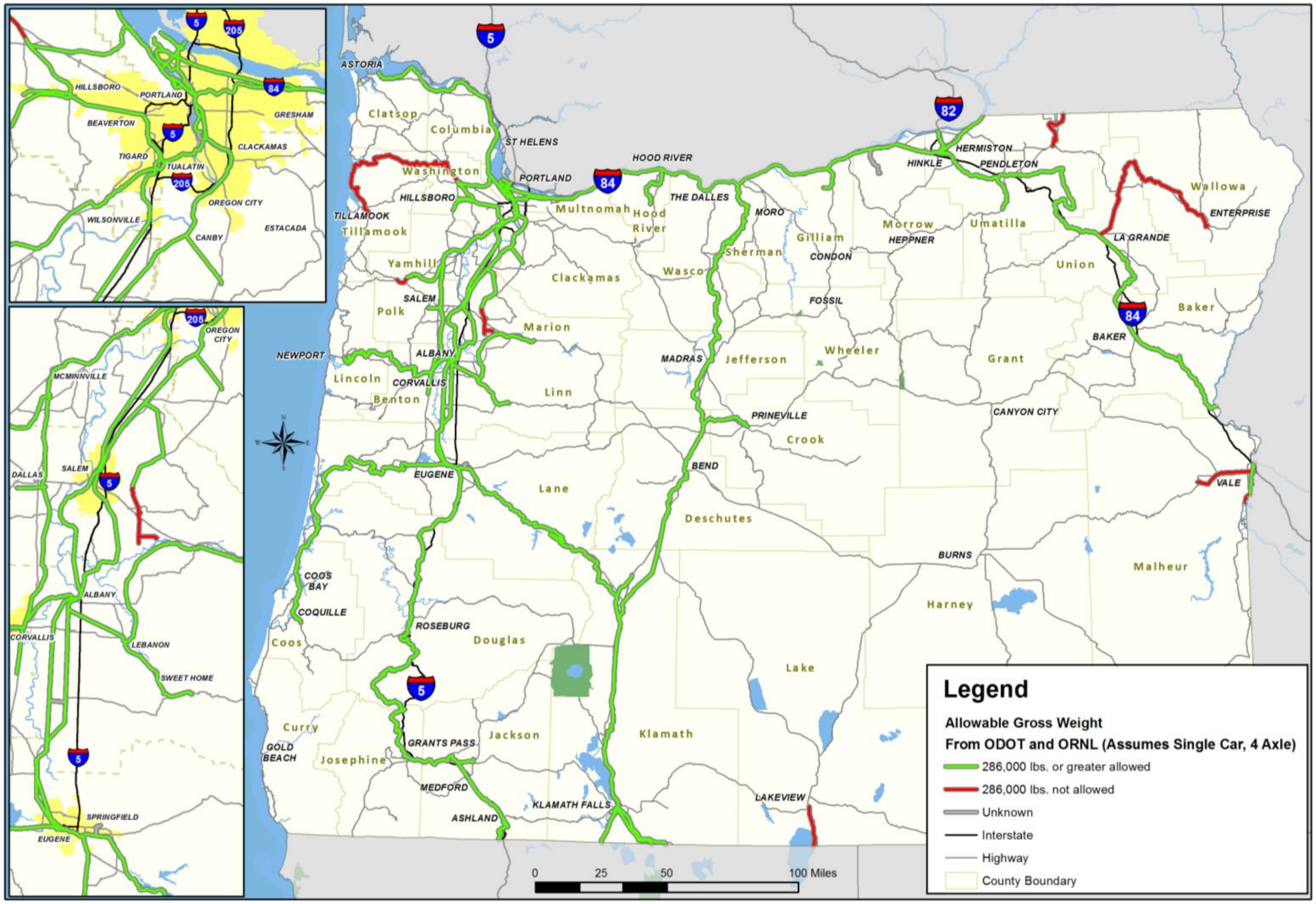
29 http://trn.trains.com/en/Railroad%20Reference/ABCs%20of%20Railroading/2006/05/Track%20classifications.aspx

Table 2.5 Freight Railroad Track Conditions

Railroad	Handle 286K GVW		FRA Class 2+		Weight Of Rail In Service 110+lbs	
	Yes	No	Yes	No	Yes	No
BNSF	100%	0%	100%	0%	100%	0%
Union Pacific	100%	0%	99%	1%	99%	1%
Albany & Eastern Railroad	100%	0%	0%	100%	50%	50%
Central Oregon & Pacific Railroad	100%	0%	98%	2%	80%	20%
City of Astoria Trackage	100%	0%	100%	0%	0%	100%
City of Prineville Railway	100%	0%	100%	0%	94%	6%
Coos Bay Rail Link	100%	0%	88%	12%	98%	2%
Hampton Railway	0%	100%	0%	100%	0%	100%
Idaho Northern & Pacific Railroad	0%	100%	100%	0%	96%	4%
Klamath Northern Railway	100%	0%	0%	100%	0%	100%
Longview Portland & Northern Railway	0%	100%	0%	100%	0%	100%
Lake Railway (miles in OR only)	0%	100%	0%	100%	0%	100%
Mount Hood Railroad	100%	0%	100%	0%	1%	99%
Oregon Pacific Railroad	100%	0%	0%	100%	4%	96%
Palouse River & Coulee City Railroad	36%	64%	36%	64%	36%	64%
Peninsula Terminal Company	100%	0%	0%	100%	0%	100%
Portland Terminal Railroad	100%	0%	0%	100%	100%	0%
Port of Tillamook Bay Railroad	0%	100%	0%	100%	94%	6%
Portland & Western Railroad	98%	2%	89%	11%	72%	28%
Wallowa Union Railroad	0%	100%	0%	100%	20%	80%
Rogue Valley Terminal RR	33%	67%	0%	100%	0%	100%
Willamette & Pacific Railroad	90%	10%	78%	22%	72%	28%
Willamette Valley Railway	50%	50%	0%	100%	13%	87%
Wyoming & Colorado RR, Oregon Eastern Div.	0%	100%	0%	100%	0%	100%
Class I Total %	**100%**	**0%**	**99%**	**1%**	**99.5%**	**0.5%**
Non-Class I line Total %	**78%**	**22%**	**65%**	**35%**	**66%**	**34%**
State Total %	**88%**	**12%**	**81%**	**19%**	**82%**	**18%**

Source: ODOT Rail Division – 286K Survey, 2006 augmented with regular updates

Figure 2.8 Freight Railroad Weight Restrictions



Source: Oak Ridge National Laboratory Rail GIS Data; ODOT Rail Division – 286K Survey, 2006; Short Line Railroad Associations.

Double-Stack Capability

The growth of the movement of intermodal containers both nationally and globally has been substantial over the past decade. When containers move by rail it is most efficient to move them stacked two-high, a configuration commonly referred to as "double-stack." Primarily by greatly reducing line-haul costs and improving ride quality, the application of this technology substantially contributed to the rapid growth in domestic and international intermodal volumes in North America since the mid-1980s.

The vertical clearance required to accommodate double stacking varies depending on the types of intermodal containers that are being used. Thus, vertical clearances are required to be at least 18′ 6″ for two stacked international (each 8′ 6″) containers, 19′ 6″ for a combination of international and domestic containers, and 20′ 8″ inches for two domestic containers (each 9′6″ in height). By way of comparison, tri-level auto-rack cars require 19′ 6″ clearance. For a route to enjoy fully unrestricted vertical clearance, the Association of American Railroads requires a minimum of 22′ 6″.

A variety of double-stacked cars exist but not every kind of double-stacked intermodal car can be accommodated on every line due to horizontal, vertical, or weight restrictions. Such restrictions are most likely found on secondary lines or lines with extensive civil works such as bridges and tunnels that would be costly to adapt to current standards.

As part of the 2010 Oregon Rail Study, a Rail Tunnel Assessment was completed that evaluated 24 out of 34 tunnels on non-Class I line routes. The 24 tunnels are distributed on three lines: CORP (11), PNWR (4), and CBR (9). Individual cost estimates were developed for repairing each of the 24 tunnels to achieve a 20-year life expectancy, and to provide sufficient clearances to accommodate double-stack rail cars. The lengths of the 24 tunnels vary widely, ranging from 128 to 4,202 feet in length. In all, the study examined nearly six miles of tunnels. The locations of the tunnels, their length, and their condition figure highly in the rehabilitation costs and risk to the system.[30] A summary of the results from the tunnel study are provided in Table 2.6.

Except for BNSF's Oregon Trunk Line, all of Class I mainlines in Oregon have double-stack capability, as shown in Figure 2.9. Some non-Class I lines have no known clearance limitations, while others cannot accept double-stack trains.

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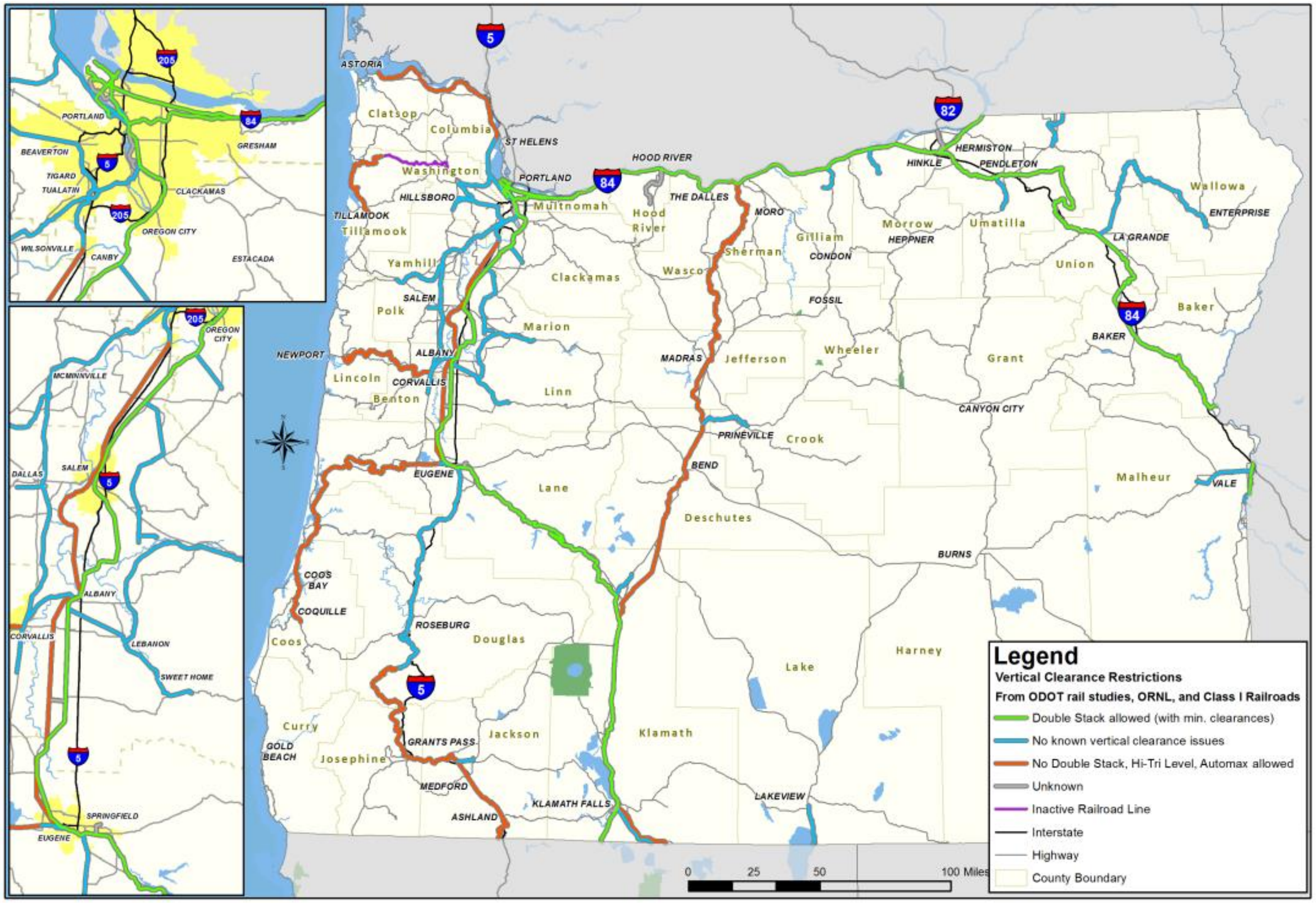
30 Oregon Rail Study, 2010

Table 2.6 Costs to Repair Tunnels and Create Double-stack Clearance

Tunnel	Railroad	Line	Total Length (feet)	Total Repair Cost (20-year Design Life)	Total Clearance Cost (Double-stack)
13	CORP	Siskiyou (Roseburg)	3,111	$0	$16,012,000
14	CORP	Siskiyou (Roseburg)	1,192	$2,569,400	$11,503,200
15	CORP	Siskiyou (Roseburg)	258	$0	$0
9	CORP	Siskiyou	2,105	$1,976,100	$2,133,000
8	CORP	Siskiyou	2,819	$0	$559,100
7	CORP	Siskiyou	128	$0	$59,000
6	CORP	Siskiyou	516	$0	$1,442,200
5	CORP	Siskiyou	341	$323,500	$372,400
4	CORP	Siskiyou	325	$0	$1,790,038
3	CORP	Siskiyou	435	$0	$1,518,000
2	CORP	Siskiyou	432	$0	$0
13	CBRL	Coos Bay	2,496	$6,846,700	$9,613,900
14	CBRL	Coos Bay	471	$0	$1,737,600
15	CBRL	Coos Bay	2,143	$5,987,200	$10,450,808
16	CBRL	Coos Bay	624	$0	$4,951,100
17	CBRL	Coos Bay	1,200	$2,144,200	$9,921,800
18	CBRL	Coos Bay	1,556	$2,806,300	$3,566,400
19	CBRL	Coos Bay	4,202	$3,413,600	$4,399,900
20	CBRL	Coos Bay	874	$263,100	$2,796,000
21	CBRL	Coos Bay	478	$0	$2,269,500
1	PNWR	United	4,105	$5,004,700	$6,262,400
0	PNWR	United	471	$0	$0
3	PNWR	Astoria	193	$0	$64,100
24	PNWR	Toledo	669	$802,600	$802,600
TOTALS			31,144	$32,137,400	$92,205,046

Source: Oregon Rail Study, 2010

Figure 2.9 Freight Railroad Vertical Clearance Restrictions



Source: Oak Ridge National Laboratory Rail Network; Class I Railroads Websites; Oregon Rail Study, Appendix C, 2010

At-Grade Crossings

At-grade crossings is one of the most pressing issues for state and local jurisdictions and the railroads themselves due to their substantial safety risk and cost. Reasons such as growth in population, motor vehicle, and rail traffic will increasingly pose more significant issues for the public at at-grade crossings, including potential safety implications, vehicle delays and associated environmental impacts.

Railroad at-grade crossing data are collected by state departments of transportation, reported to the FRA, and made available to the public through the Office of Safety Analysis. In Oregon, there are 1,789 public at-grade rail crossings, with the most crossings situated in Linn, Marion, Multnomah and Lane County, all of which are situated along the Pacific Northwest corridor. The most typical warning signs used are cross bucks and stop signs, with only 62 crossings having flashing lights, and only 749 (42 percent) having any kind of gates. Railroads with the most crossings include Portland and Western Railroad (553), UP (447), Central Oregon & Pacific (168) and BNSF (126).[31] In Oregon, between 2008 and 2012 there were 74 highway-rail incidents, 57 of them took place at public crossings, these resulted in 20 casualties (fatalities and injuries).[32]

Safety at at-grade crossings is influenced by the crossings physical and operational characteristics, including level of traffic – AADT and number of trains, geometric conditions at the site (sight distances, angle between roadway and rail line, vertical curvature), pavement condition, operating speeds – both vehicular and rail traffic, warning devices and control systems, etc. Environmental conditions such as weather and lighting also affect safety at at-grade crossings. Considering a multitude of these factors and actual incident history, the ODOT Rail Division has come up with a list of "high risk" crossings in Oregon, as shown in Table 2.7. The list is only an indication that conditions at these crossings may possibly be more hazardous than others based on the data collected by the ODOT Rail Division.

An additional rail safety concern is trespassing. Trespassing on railroad private property and along railroad right-of-way is the leading cause of rail-related fatalities in the U.S. Since 1997, more people have been fatally injured each year by trespassing than in motor vehicle collisions with trains at highway-rail grade crossings. In Oregon, between 2008 and 2012 there were

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[31] FRA, Office of Safety Analysis' accidents and incidents, inventory and highway-rail crossing data.

[32] Ibid.

79 casualties due to trespassing (death or injury) and 68 of them occurred at locations other than at-grade crossings.[33]

[33] Ibid.

Table 2.7 Top 25 High-Risk Rail Crossings in Oregon

ODOT Rank	U.S. DOT	Crossing ID	Railroad	County	Location	Street Name	Collisions 2008-2012	Trains/ Day	Max Auth Speed	AADT	JAQUA Rank
1	749212B	FD-755.41	PNWR	Washington	Beaverton	Farmington-Lombard	0	44	25	45,925	1
2	759683T	C-690.40	UP	Linn	Albany	Queen Ave	0	40	30	16,000	2
3	749204J	3E-030.58	PNWR	Washington	Progress	Scholls Ferry Rd	0	42	55	46,900	3
4	809363H	2A-293.30	UP	Union	Lone Tree	McAlister Road	1	25	70	2,128	352
5	809058X	2AH-190.10	UP	Umatilla	Cold Springs	Canal Rd 1203	4	10	40	380	447
6	809057R	2AH-188.80	UP	Umatilla	Hermiston	S Ott Rd 1211	1	11	60	70	498
7	808386L	2AE-005.90	UP	Multnomah	Portland	N Columbia Blvd	0	14	25	21,740	4
8	749205R	3E-029.91	PNWR	Washington	Progress	Hall Blvd (Hwy 141)	0	48	60	27,763	5
9	058293U	3E-034.40	PNWR	Washington	Durham	Durham Rd (Beav-Tual Hwy)	0	36	37	22,900	6
10	101884N	3E-036.15	PNWR	Washington	Tualatin	Tualatin Sherwood Rd	1	42	34	33,139	7
11	760058E	C-717.10	UP	Marion	Salem	McGilchrist Street	0	22	35	11,327	10
12	759763L	C-762.40	UP	Clackamas	Milwaukie	SE Harmony Rd At Linnwood	0	35	60	15,500	11
13	759646R	C-721.79	UP	Marion	Salem	Hyacinth St	0	16	70	15,540	12
14	760017A	C-755.70	UP	Clackamas	Oregon City	10th St	2	15	40	12,300	17
15	759770N	C-760.80	UP	Clackamas	Clackamas	Lawnfield Rd 22004	0	16	60	10,250	22
16	058286J	3E-033.54	PNWR	Washington	Tigard	Bonita Rd	1	36	50	12,000	25
17	066845C	10A-028.30	BNSF	Deschutes	La Pine	The Dalles-Calif Hwy 97	1	9	49	9,600	205
18	748995V	CF-459.60	UP	Klamath	Near Chilloquin	Old Korral Rd(USFS 5811-260)	2	22	50	120	479
19	759757H	C-764.10	UP	Clackamas	Milwaukie	Oak St	1	24	60	9,500	44

ODOT Rank	U.S. DOT	Crossing ID	Railroad	County	Location	Street Name	Collisions 2008-2012	Trains/ Day	Max Auth Speed	AADT	JAQUA Rank
20	058305L	3E-039.20	PNWR	Washington	Tonquin	Tonquin Rd.	1	38	60	7,497	48
21	807445H	2AD-005.80	UP	Multnomah	Portland	N Columbia Blvd	0	8	55	21,740	68
22	749182L	FD-744.20	PNWR	Clackamas	Lake Oswego	State St (Oswego Hwy Ore43)	2	20	30	34,100	92
23	807385B	2B-007.47	UP	Multnomah	Portland	N Columbia Blvd	0	6	15	21,740	98
24	759605L	C-735.50	UP	Marion	Woodburn	Hardcastle Street	2	14	45	4,100	215
25	066780L	28T-131.80	BNSF	Deschutes	Prineville Jct	NE O'Neil Way	0	11	50	2,900	271

Source: ODOT Rail Division

Bridge Conditions

Conditions of bridges on rail lines can also significantly impact railroad operations, and affect safety, operations and mobility. A recent example of a railroad accident in New Jersey happened as a direct result of a bridge collapse. The incident caused a hazmat train to derail and release toxic substance in the air which created health concerns for the communities.[34]

As part of the 2010 Oregon Rail Study, a complete bridge conditions assessment was conducted on 332 bridges located on 15 non-Class I railroads in Oregon in 2008. The bridge conditions were evaluated to uncover the extent to which poor conditions might affect future operations on those lines. The evaluation looked at how much weight the bridges can carry (load capacity) and what the remaining life span of the bridges was likely to be. Following the inventory of bridge conditions, cost estimates to upgrade or repair them were developed. The upgrading was focused on achieving an ability to carry 286,000-pound cars at 10 mph and at 25 mph. It was assumed that total replacement would enable 286,000-pound cars. The bridge condition ratings and costs estimates are shown in Table 2.8 for each non-Class I line.

Since the assessment, several rail lines have received *Connect*Oregon funds to rehabilitate bridges. Two examples in the Mount Hood Railroad Bridges Fortification, at $247,000; and the Albany & Eastern Railroad – Mill City Branch Bridge Rehab and 286K Rail upgrade, funded at $4 million.[35] Though these funds do not address all bridge repair needs on the lines, they are certainly steps in the right direction to help improve railroad conditions.

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[34] http://www.cnn.com/2012/12/01/us/new-jersey-train-derail

[35] http://www.oregon.gov/ODOT/TD/TP/ConnectOregon%20Documents/Funded%20Project%20Lists/All%20CO%20Summary.pdf

Table 2.8 Costs to Upgrade, Repair and Replace Non-Class I Line Bridges

	Condition of Bridge Segments[12]			Costs to Upgrade or Repair to Achieve 286,000-lb Car Capacity		Costs to Replace Bridges
Railroad	Good	Fair	Poor	at 10 MPH	at 25 MPH	
Total	111	266	157	$124,300,000	$142,600,000	$1,436,000,000
Coos Bay Rail Link	5	35	70	$45,600,000	$47,600,000	$462,200,000
Portland & Western	2	2	1	$34,400,000	$41,700,000	$438,300,000
Willamette & Pacific	23	91	44	$31,700,000	$32,300,000	$260,700,000
Central Oregon & Pacific	13	38	21	$6,400,000	$14,100,000	$183,800,000
Willamette Valley	1	4	4	$2,700,000	$3,100,000	$20,200,000
Oregon Pacific		7	2	$900,000	$1,000,000	$7,000,000
Albany & Eastern		5	3	$500,000	$500,000	$7,500,000
Idaho Northern & Pacific			1	$400,000	$400,000	$5,800,000
Palouse River & Coulee City	44	70	11	$300,000	$300,000	$8,700,000
Hampton	2	3		$300,000	$300,000	$2,500,000
Lake Railway	7	1		$300,000	$300,000	$2,900,000
Mount Hood	1	2		$200,000	$200,000	$12,200,000
Wyoming & Colorado		2		$100,000	$100,000	$8,500,000
City of Prineville	6			$90,000	$200,000	$3,600,000
Wallowa Union	7	3		$80,000	$80,000	$11,400,000
Klamath Northern		3		$17,000	$17,000	$300,000

Source: Oregon Rail Study, 2010

2.2 Existing and Future Freight Rail Demand

This section provides detail on what has been driving freight rail demand in Oregon, as well as how such demand is likely to change by the plan horizon year of 2035. The first part of this section provides context for understanding the place of rail in Oregon; the second part of this section presents a detailed rail traffic profile to further understand how rail traffic moves in Oregon currently and is likely to move in the future. The third part of this section provides detailed train volume estimates on each rail corridor for the base and future year.

Forecasting Freight Demand

The forecast incorporated into the Federal Highway Administration's Freight Analysis Framework (FAF) version 3.4 was utilized to project future traffic flows for all modes. This dataset contains a base year of 2007, synthesized ("provisional") data through 2011, and a forecast through 2040.

The basic assumption of all freight demand forecasts is that changes in the value of industry output come with commensurate changes in the value (and thus volume) of the inputs. These inputs and outputs are unique to every industry, and are captured by economists in "input-output" tables. With these relationships defined, future demand for goods movement is projected off of historical freight flow data by mode through the application and adaptation of a macro-economic forecast that describes activity by economic sector and geographic region.

It is important to recognize that a goods movement forecast of the type provided in the FAF is a projection of future trends based on a combination of historical patterns and expectations for the primary macro-economic drivers that affect economic growth. These include demographic changes, global demand for various commodities, monetary and tax policy, cost of production across regions, and trade policies. From this standpoint, the FAF forecast offers a useful gauge of future demand for goods movement in Oregon and the nation, and can provide a baseline against which alternative future scenarios can be evaluated, such as may occur with the development of major new industries, changes in the relative competitiveness between transportation modes, or broad policy changes affecting energy use, etc.

Commodity Flow Profile – Current and Future

General commodity flows in Oregon were drawn from the FAF 3.4. Table 2.9 shows the commodity flow tonnages and values by mode and by year (for 2011 and 2035). As shown, truck flows by tonnage dominate throughout Oregon, making up three-quarters of all freight flows in 2011. Trucks are anticipated to continue to be the dominant transportation mode in the future, maintaining their mode share in 2035. Rail carried 12 percent of freight tonnage in 2011, and is projected to mostly maintain its share through 2035. Water carried about 1 percent of all tonnage in 2011 and is expected to also maintain its small share in

2035. In addition, multiple modes and mail, which include all container traffic as well as any shipments done by multiple modes and by parcel delivery mail, will maintain its share of 6 percent volume by tonnage within Oregon. Overall, from a tonnage perspective, freight mode split in the future will largely parallel that of the current (2011) picture, with rail (combined with multiple modes and mail) making up about 17 percent of total flows.

Overall, in terms of tonnage, all of the modes are projected to hold close to their shares over the long run. Based on value, truck and rail are expected to have a slight reduction in share of value carried in 2035 as compared to 2011. Share of value carried by air is expected to increase during the same period. Note that while share of air tonnage remains relatively flat, the share of air value increases three percent; this is explained by the fact that air carries more high-value, time sensitive products as compared to truck or rail. Multiple modes and mail are also projected to increase share of value carried as containers increasingly carry more high-value goods.

In the future, air and multiple modes and mail will be the fastest growing modes by value, exhibiting Compound Annual Growth Rates (CAGR) of more than 7.1 percent and 4.5 percent, respectively. By tonnage, the fastest growing modes are water and air (excluding other and unknown), both exhibiting CAGR greater than 2.5 percent. This further illustrates the increasing importance of moving high-value, time sensitive goods, and the potential transfer of goods moved on trucks to intermodal containers and planes. Non-containerized rail is anticipated to grow slowly on the other hand, especially in terms of value, reflecting modest growth in bulk commodities, which are dominated by grain, coal, chemicals, and non-metallic minerals.

Table 2.9 Statewide Commodity Flows by Mode

Mode	2011	2035	CAGR (2011-2035)	Mode Split (2011)	Mode Split (2035)
Tonnage (kTons)					
Truck	221,046	399,853	2.5%	75%	75%
Rail	34,840	59,282	2.2%	12%	11%
Water	3,950	7,251	2.6%	1%	1%
Air (include truck-air)	68	194	4.5%	0.02%	0.04%
Multiple modes & mail	16,782	33,388	2.9%	6%	6%
Pipeline	10,082	13,781	1.3%	3%	3%
Other and unknown	7,350	17,254	3.6%	2%	3%
Total	294,119	531,004	2.5%	100%	100%
Value (Millions of 2007 $)					
Truck	$ 212,247	$ 425,701	2.9%	72%	66%
Rail	$ 12,549	$ 20,582	2.1%	4%	3%
Water	$ 1,116	$ 1,251	0.5%	0.4%	0.2%
Air (include truck-air)	$ 6,401	$ 32,863	7.1%	2%	5%
Multiple modes & mail	$ 49,430	$ 141,375	4.5%	17%	22%
Pipeline	$ 4,792	$ 6,906	1.5%	2%	1%
Other and unknown	$ 7,758	$ 17,266	3.4%	3%	3%
Total	$ 294,293	$ 645,944	3.3%	100%	100%

Source: FAF 3.4

Rail Traffic Profile – Base and Future

The following section is based on data derived from the Surface Transportation Boards Private Carload Waybill Sample. As such, we have presented general statistical information, herein, but have not attributed specific commodity movements with any railroads to preserve their business confidentiality.

Railroads connect shippers with carriers, and link local products to international markets. To better understand how rail traffic flows in Oregon, this section presents existing rail flows and estimates how they will likely change in the future. Specifically, this section provides information on train types, commodities, flow direction, and key trading locations within and outside Oregon for the base year. For the future year, changes in flows by direction and by commodity are also estimated.

The base data source used for subsequent analysis is the 2010 Oregon Confidential Carload Waybill Sample data generated by the Surface Transportation Board (STB). The Waybill Sample is a stratified sample of carload waybills for all U.S. rail traffic submitted by rail carriers terminating 4,500 or more revenue carloads annually. Thus, while the Waybill Sample properly represents traffic handled by Class I and regional railroads, volume on smaller carriers tends to be underrepresented.

It is also useful to shed light on how to interpret inbound, outbound and intra-state flows from Waybill Sample data, which can best be thought of as based on end points of contact. Tonnages are considered inbound to Oregon if the state is the destination, i.e. the goods are consumed or switch modes. This would include traffic coming from throughout North America, as well as traffic destined for export through Oregon's river- and seaports. Similarly, outbound traffic comprises all rail tonnage that originates in Oregon, as well as imports loaded onto rail from ships and barges at Oregon ports, and shipped out of state. Finally, intra-state moves consist of moves that begin and end their trip by rail in Oregon.

Base Year Rail Flow Characteristics

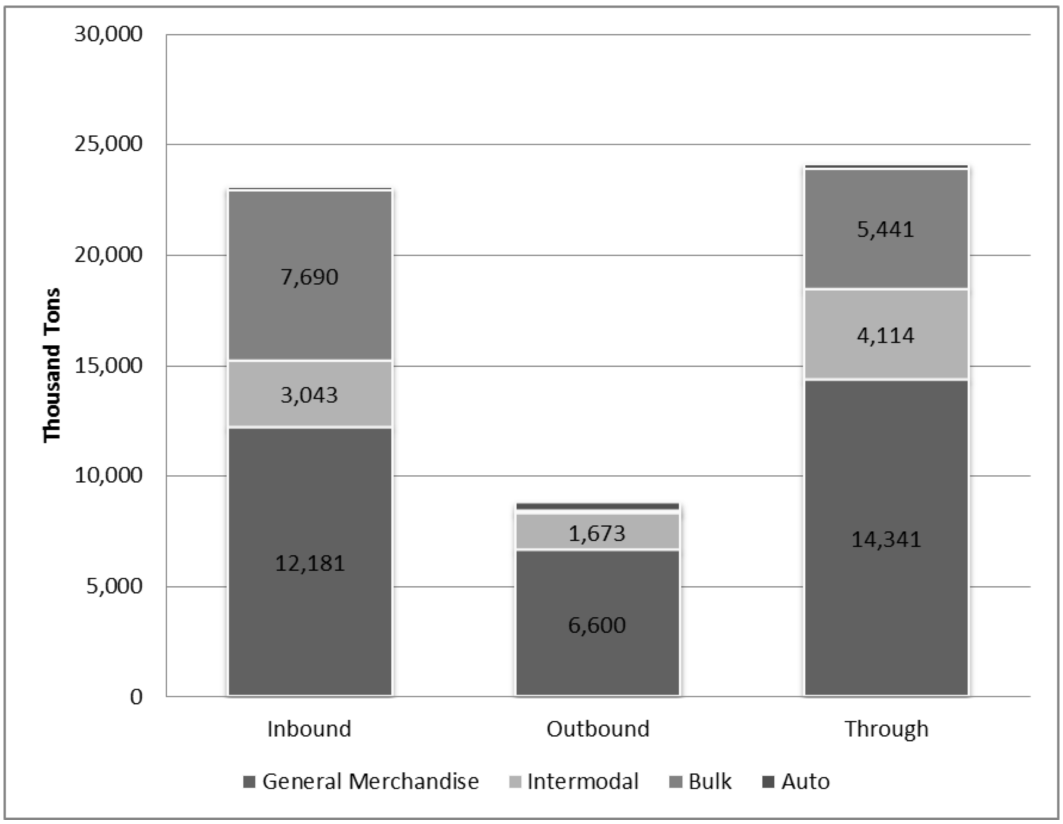
Figure 2.10 shows rail flow volumes by direction and service type in 2010. The largest rail flows for Oregon are through rail flows, which are flows that neither originate nor terminate in Oregon. This indicates that Oregon is a major rail thoroughfare that acts as a connection to other states along the transcontinental network. Inbound movements make up slightly less than half of all rail traffic for the state (23 million tons), followed by outbound traffic, which represents roughly 16 percent of rail traffic in Oregon (approximately 8.8 million tons). Intra-state flows make up only 0.36 million tons, or 0.6 percent of total traffic (not shown). It is likely that this figure is underreported, as volume handled in local service by some smaller non-Class I lines is not captured in the Waybill Sample.

In addition to understanding flow directions, determining the service type can help to distinguish bulk from intermodal rail traffic, information which is important to understanding operations and conducting capacity analysis (different types of trains have different impacts on capacity). The four service type categories captured by the Waybill Sample include:

- **Auto Train Service.** The delivery of automobiles via specialized intermodal auto rail cars called auto racks and the transportation of auto parts;
- **Bulk Train Service.** Heavy aggregates, ore, or other mass-transported commodities, which are often delivered in an uncovered car;
- **Intermodal Train Service**. The transportation of containerized cargo in standard-sized containers and in trailers ; and
- **General-Merchandise Train Service.** Miscellaneous goods traveling in boxcars and other non-intermodal or bulk commodity cars.

An analysis of the types of goods moving on railroads in Oregon as shown in Figure 2.10 indicate that the majority of through traffic movements are general merchandise, and so are the majority of inbound and outbound rail movements. For through and inbound movements, there are also significant bulk movements and intermodal movements. On the outbound side, there are significantly more intermodal movements and relatively few bulk movements. Intermodal rail activity is associated with hubs located in Portland, and therefore higher outbound intermodal tonnages are reasonable given that it is the point from which international containers begin their rail trip.

Figure 2.10 Rail Volumes by Service Type, Thousand Tons, 2010



Source: STB Waybill Sample Data

Reviewing Table 2.10, freight movement by originating railroad[36], it is shown that UP is the largest carrier of freight in Oregon, at 51 percent, followed by

[36] The originating railroad is the railroad on which a trip begins. The originating railroad can be different from the terminating railroad if a shipment is interchanged to another carrier on its way to its eventual destination. By looking at both originating and terminating railroad information, the volume of rail traffic that is switched between

Footnote continued

BNSF at 20 percent. In addition, together, Canadian Pacific (CP) and Canadian National (CN), both of which have substantial U.S. operations, are the originating railroad for 19 percent of all rail flows moving in Oregon, most of which will terminate or go through Oregon. This indicates that a significant portion of rail flows from Oregon are long distance movements to/from locations east of the Mississippi and in Canada.

From a terminating railroad perspective, rail volumes are shown in Table 2.11. All of the flows are eventually carried on either UP or BNSF lines as they enter or pass through Oregon. Since at least 19 percent of this traffic originated from a different railroad, it means that there is significant switching activity taking place, and that relationships between the different Class Is are important for operations of railroads associated with Oregon.

Table 2.10 Rail Volumes by Originating Railroads (Thousand Tons, 2010)

Railroad	Inbound	Intra	Outbound	Through	Total	% Total
UP	9,619	308	6,286	12,539	28,753	51%
BNSF	8,406	55	2,499	5,317	16,278	29%
CPRS	3,439	0	0	2,005	5,444	10%
CPUS	852	0	0	2,863	3,715	7%
CN	314	0	0	659	973	2%
Other RR	450	0	0	753	1,203	2%
Total	23,081	363	8,786	24,136	56,365	100%

Source: STB Waybill Sample Data

Table 2.11 Rail Volumes by Destination Railroads (Thousand Tons, 2010)

Railroad	Inbound	Intra	Outbound	Through	Total	% Total
UP	14,184	303	5,393	16,879	36,759	65%
BNSF	8,897	59	2,325	6,119	17,400	31%
CSXT	0	0	372	226	598	1%
CPRS	0	0	150	357	507	1%
CN	0	0	136	201	338	1%
Other RRs	0	0	410	353	763	1%
Total	23,081	363	8,786	24,136	56,365	100%

Source: STB Waybill Sample Data

railroads along its journey can be estimated, as well as the percent of rail traffic that is destined for other regions.

Another way to help understand the rail market is to look at the breakdown of commodities. As shown in Table 2.12, on the inbound side the largest commodity groups destined for Oregon include cereal grains, basic chemicals, fertilizers, coal and waste and scrap. These commodities come from different states and are either consumed within the state or exported out. On the outbound side, the top commodities include wood products, paper products and other agriculture products, mirroring Oregon's traditional forest products and agricultural sectors. The most significant intra-state flows captured by the Waybill Sample are the non-metallic mineral products movements within the state, as well as some cereal grains. Finally, products that go through Oregon include substantial amounts of cereal and agricultural products, wood products, and mixed freight destined for other states. It is important to note that while understanding through flows are important to help track volumes on rail lines, these flows in general are not related to the economy of a state. An evaluation of industries, top commodities and their link to the economy will be provided in the *Needs Assessment* Technical Memorandum.

Table 2.12 Rail Volumes of the Top 15 Commodity Types (Thousand Tons, 2010)

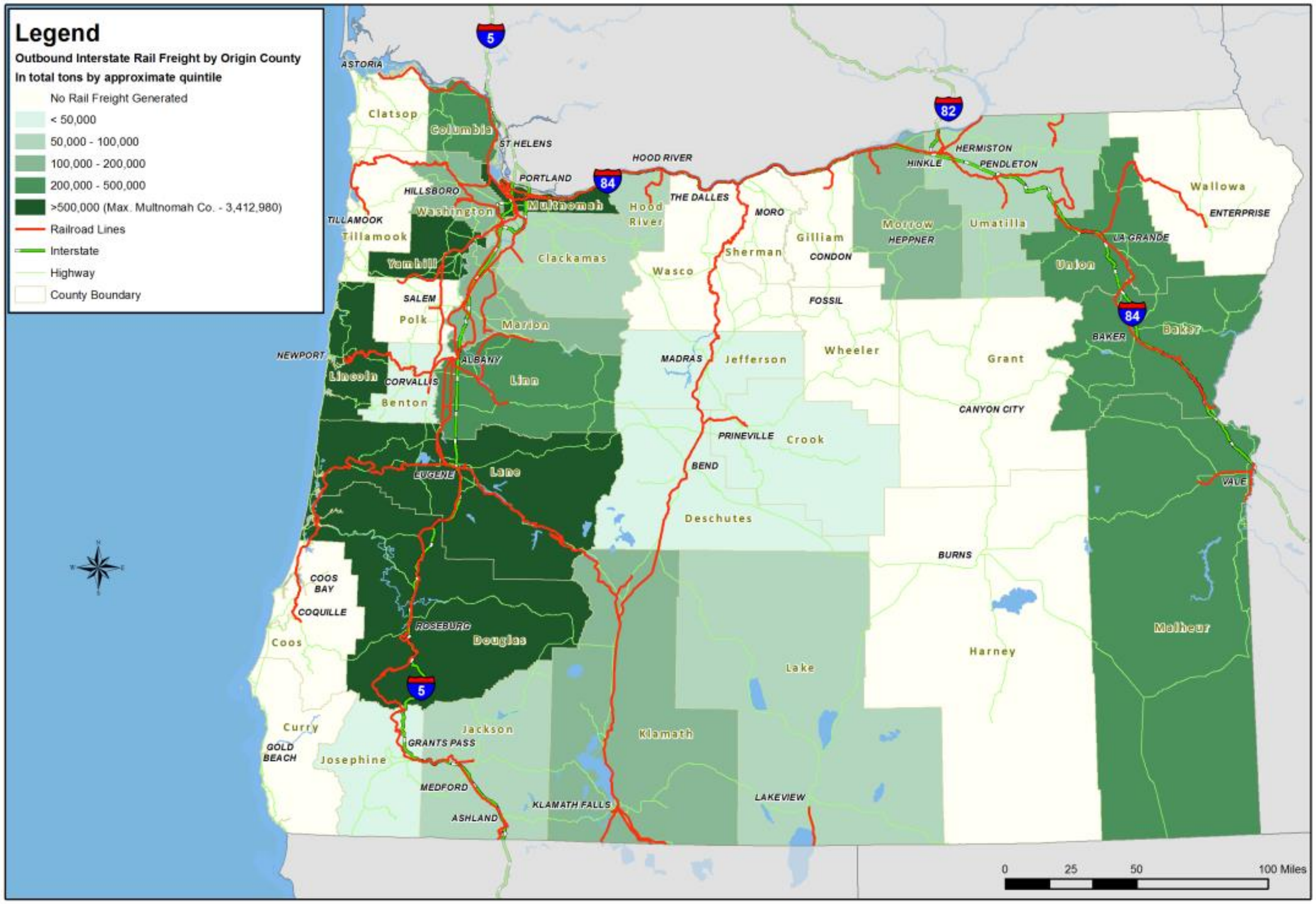
Commodity	Inbound	Intra	Outbound	Through	Grand Total	Percent Total	% Total w/o Thru
Cereal Grains (including seed)	4,321	60	118	2,770	7,268	13%	14%
Wood Products	856	12	3,502	2,891	7,260	13%	14%
Mixed Freight	1,602	5	932	3,319	5,859	10%	8%
Other Agricultural Products	1,350	0	306	2,808	4,463	8%	5%
Basic Chemicals	3,184	8	62	879	4,133	7%	10%
Fertilizers	3,188	27	155	620	3,990	7%	10%
Pulp, Newsprint, Paper, and Paperboard	471	0	1,141	1,400	3,012	5%	5%
Coal	2,186	0	0	178	2,364	4%	7%
Waste and Scrap	1,535	42	121	495	2,192	4%	5%
Animal Feed and Products of Animal Origin, not elsewhere classified (n.e.c.)	216	0	7	1,916	2,139	4%	1%
Other Prepared Foodstuffs, and Fats and Oils	796	4	263	1,014	2,077	4%	3%
Non-Metallic Mineral Products	306	169	584	480	1,539	3%	3%
Base Metal in Primary or Semi-Finished Forms and in Finished Basic Shapes	302	0	480	727	1,509	3%	2%
Coal and Petroleum Products, n.e.c.	684	0	90	713	1,487	3%	2%
Non-Metallic Minerals, n.e.c.	108	23	76	887	1,094	2%	1%
Other Commodities	1,977	13	948	3,041	5,979	11%	9%
Total	**23,081**	**363**	**8,786**	**24,136**	**56,365**	**100%**	**100%**

Source: STB Waybill Data

Figures 2.11 and 2.12 show the rail tonnages originating and terminating in each Oregon County. Counties along the Willamette Valley and counties in Eastern Oregon have the highest outbound tonnages. The county with the highest outbound tonnage is Multnomah County, comprising more than 37 percent of total freight tonnages. A large percentage of the outbound tonnages from Multnomah County are associated with the Port of Portland. There are also other activities that contribute to a high level of economic activity in the region. According to the 2011 Oregon Freight Plan, many metal and food manufacturing activities are concentrated in the Portland and Salem areas. In addition, wood products are found largely west of the Cascade Range and paper production facilities are located mostly in Portland and Northern Willamette Valley. The concentration of these key industries in the west can offer one possible explanation for high originating tonnages.

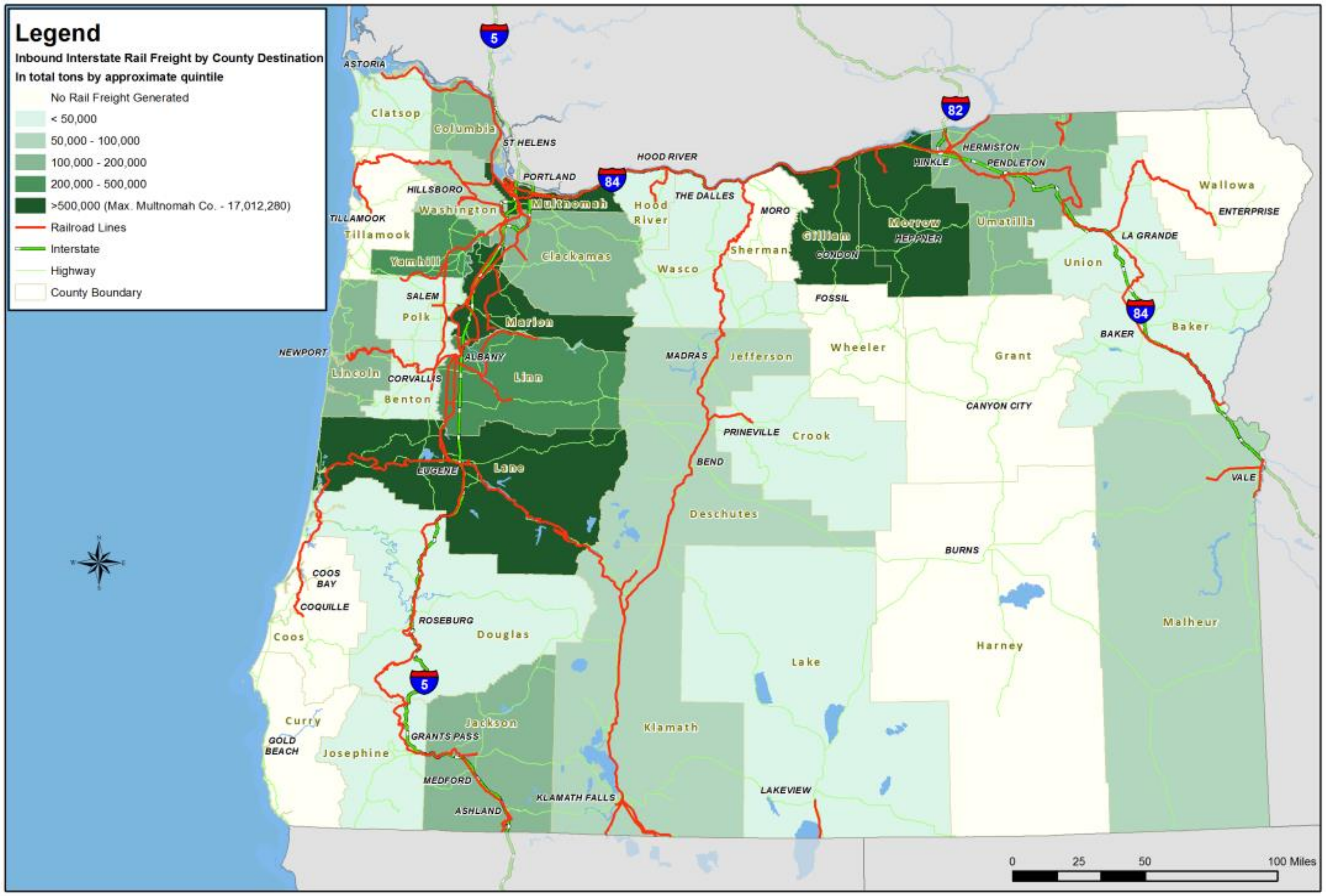
On the inbound side, the county receiving the highest tonnages of goods is Multnomah County once again, which houses the largest population center in Oregon (Portland). Other northwestern counties, along with Gilliam and Morrow counties also receive significant volumes of cargo, most of which are general carload cargo.

Figure 2.11 Total Rail Tonnages Originating in Oregon Counties, 2010



Source: STB Waybill Sample Data

Figure 2.12 Total Rail Tonnage Terminating in Oregon Counties, 2010



Source: STB Waybill Sample Data

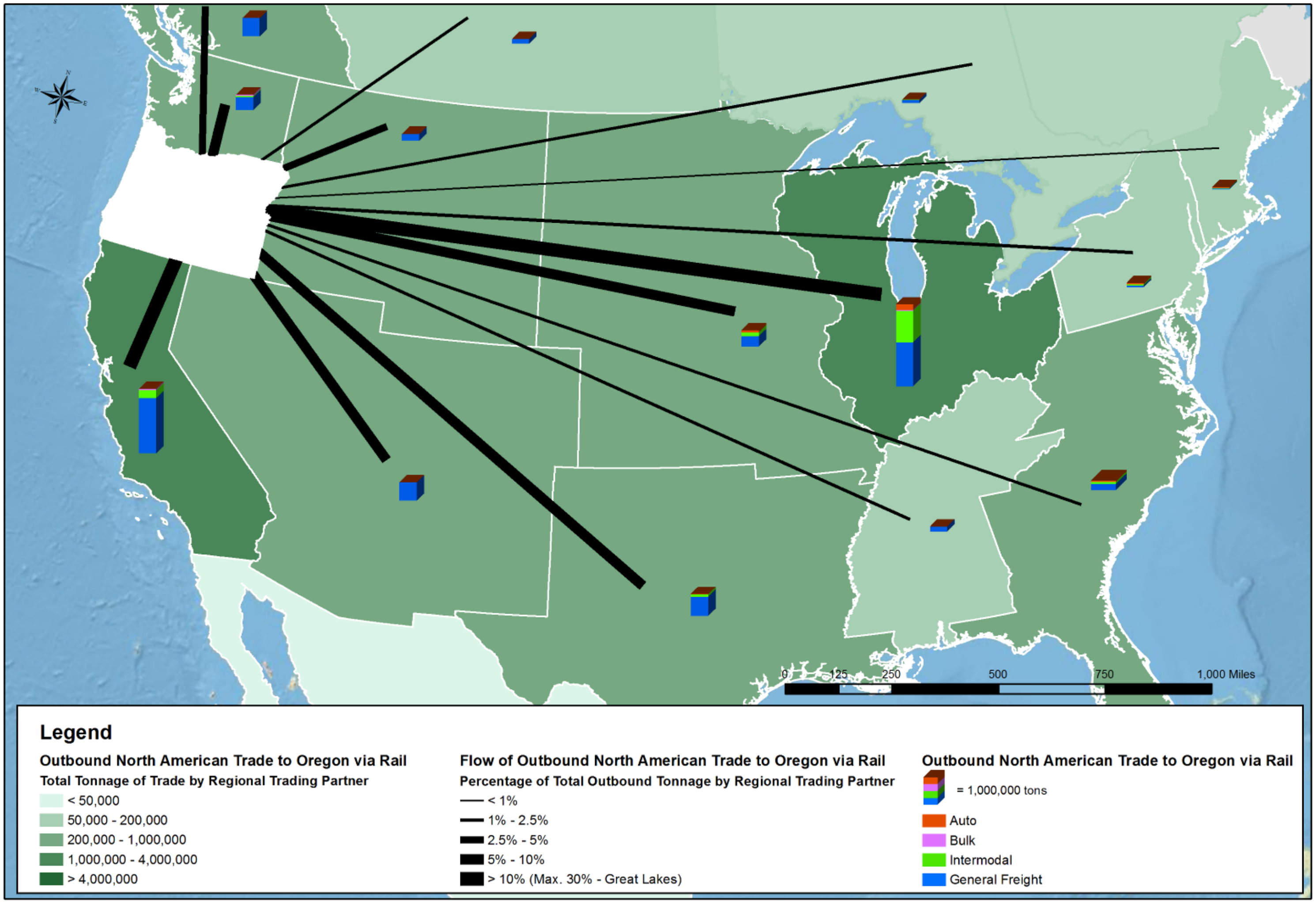
Figures 2.13 and 2.14 depict Oregon's trading partners within North America. As shown on the outbound side, two states alone (Illinois and California) make up more than half of the rail tonnages outbound from Oregon. Trade to Illinois consists of large quantities of general merchandise (mostly wood products) and intermodal traffic, as well as significant quantities of imported automobiles. Wood products local to Oregon as well as consumer products and cars imported through the Port of Portland are distributed to domestic markets at the regional consumer center in Chicago, which also happens to be the primary gateway between the eastern and western railroads. Nearly a quarter of traffic is also destined for California, carrying mostly wood products, paper products, and base metals. These goods are processed in California for domestic distribution or export to other countries through the San Pedro Bay ports. Other top states/regions receiving goods from Oregon include Washington, Texas and British Columbia, receiving a combination of local Oregon products such as wood and metal for consumption and export.

On the inbound side as shown in Figure 2.14, the top inbound states/regions include Washington, Saskatchewan (Canada) and Wyoming. The primary goods from Washington consist of waste and scrap carried in intermodal containers[37].

From Saskatchewan the primary product carried is fertilizer, with small amounts of coal and base metal products. Finally, over 2.9 million tons of basic chemicals (soda ash destined for export) along with coal that is utilized for electricity generation in the Portland region travels from Wyoming to Oregon.

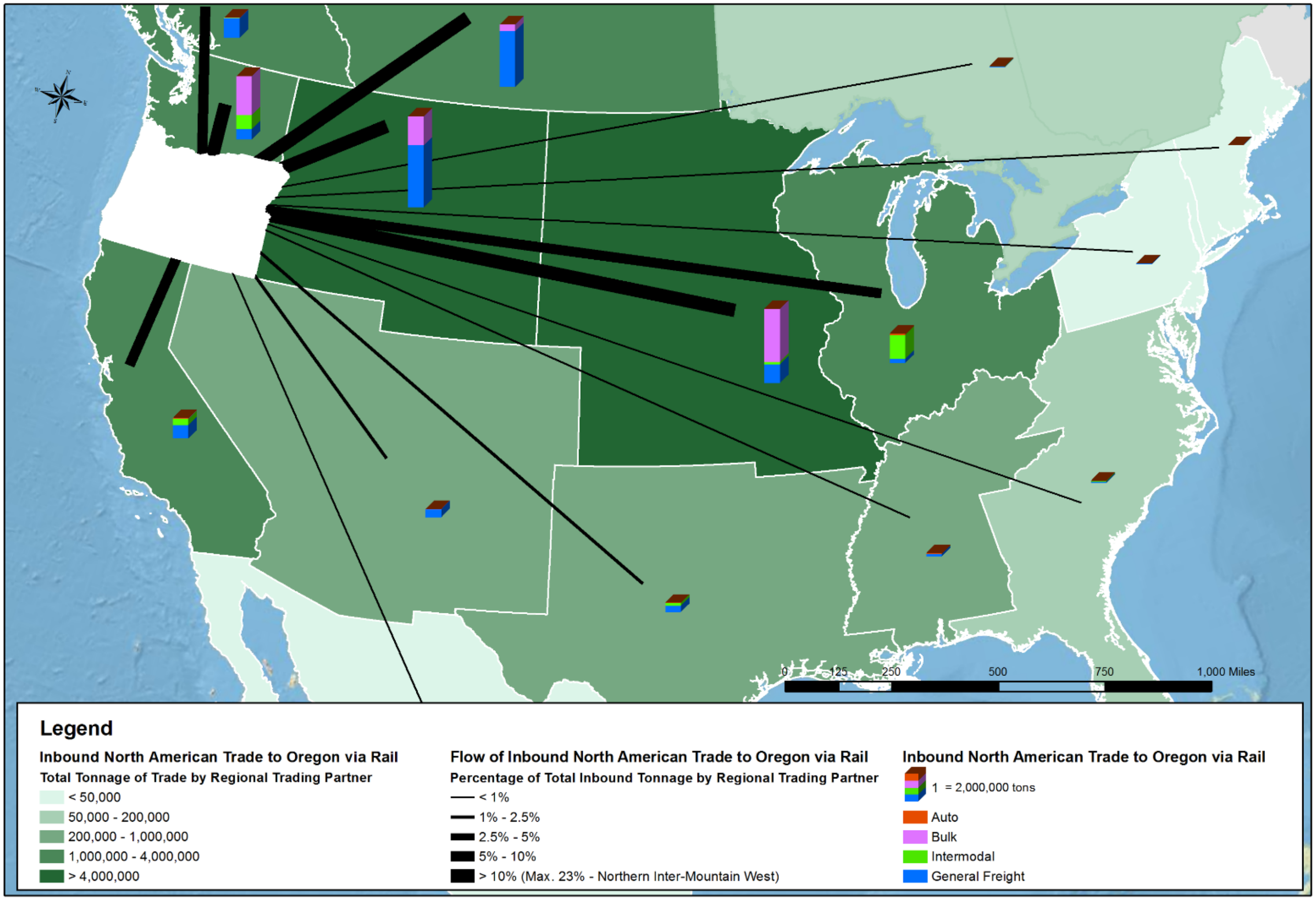
[37] The Waybill Sample shows a sizeable flow of coal from Washington that terminates in Oregon. In actuality, this traffic originates in Wyoming, but is being reported as two separate moves for commercial reasons, one from Wyoming to Washington on BNSF, and hence on UP to Oregon.

Figure 2.13 Total Rail Tonnage Destined to Other States and Canadian Regions from Oregon, 2010



Source: STB Waybill Data

Figure 2.14 Total Rail Tonnage from Other States and Canadian Regions to Oregon, 2010



Source: STB Waybill Data

Future Rail Flow Characteristics

Forecasting Methodology

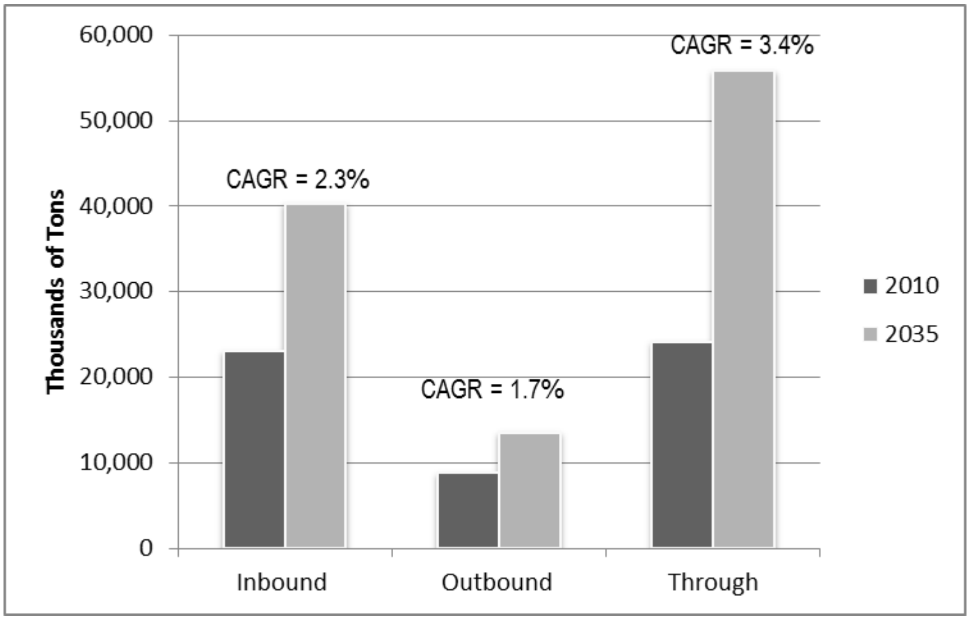
While the STB Waybill Sample data provides base year rail flows for this study, to further investigate the needs of freight rail system users in the future, base year data must be forecast to the future. To accomplish this, the forecast incorporated into FAF3.4[38] was applied to the 2010 Waybill Sample data in a multi-step approach to come up with commodity-specific, origin-destination-specific and mode-specific forecasts of Oregon rail flows in 2035. More details on the steps involved in the forecast are provided in Appendix A.

Forecasting Results

Figure 2.15 shows the projected growth of rail flows by direction in Oregon. This chart indicates that through volumes are expected to grow the fastest between 2010 and 2035, at 3.4 percent annually, followed by inbound traffic at 2.3 percent annually. Outbound traffic is expected to grow the slowest at 1.7 percent annually. In terms of commodities (as shown in Figure 2.16), cereal grains will continue to dominate the market, making up 14 percent of all rail flows while experiencing moderate growth at 2.1 percent annually. Some of the fastest growing commodities within the "other" category include alcoholic beverages, meat, fish/seafood, misc. manufactured products, transportation equipment and pharmaceutical products. Wood products will also form about 12 percent of flows in 2035 but will grow at a much slower rate of 1.5 percent. Overall, the fastest growing major commodity is mixed freight at 3.6 percent, signifying the continued competitiveness of freight moving intermodally in containers. Table 2.13 provides more detailed information about growth rates by direction for each of the top commodities.

[38] FAF3.4 is the latest update of FAF3.0, which is published in 2012 and includes provisional data for the year 2011.

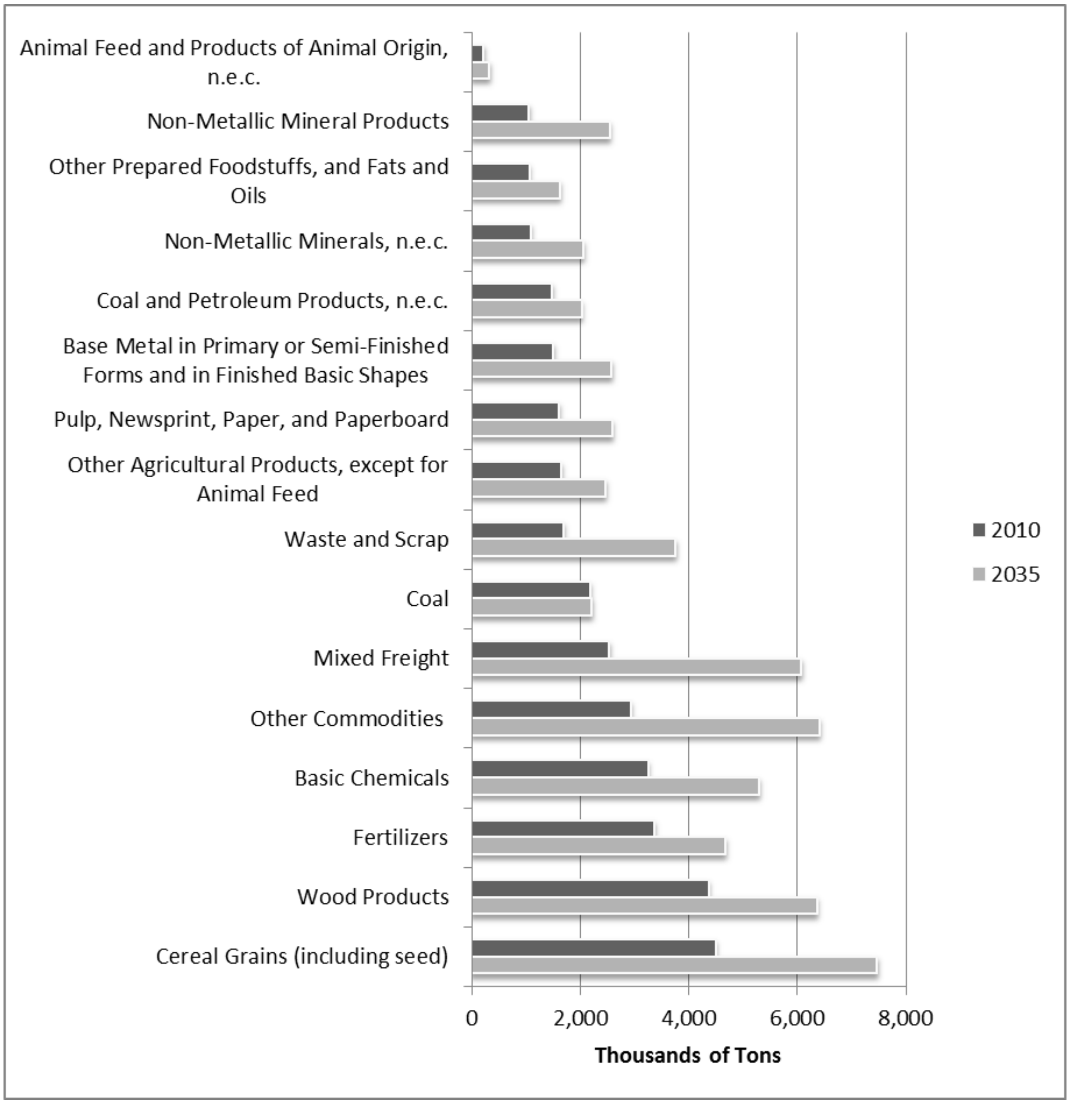
Figure 2.15 Oregon Rail Flows by Direction
2010 and 2035



Source: STB Waybill Sample for Oregon; FAF3.4 Growth Factors

Figure 2.16 Oregon Rail Flows by Commodity

2010 and 2035



Source: STB Waybill Sample for Oregon; FAF3.4 Growth Factors

Table 2.13 Oregon Rail Flows Growth by Direction and Commodity, 2010 and 2035

Commodity	Inbound			Intra			Outbound			Through			Total w/o Thru			% Total All Commodities	
	2010	2035	CAGR	2010	2035	CAGR	2010	2035	CAGR	2010	2035	CAGR	2010	2035	CAGR	2010	2035
Cereal Grains (including seed)	4,321	7,028	2.0%	60	152	3.8%	118	296	3.8%	2,770	11,864	6.0%	4,499	7,476	2.1%	14%	14%
Wood Products	856	1,885	3.2%	12	20	2.1%	3,502	4,462	1.0%	2,891	5,466	2.6%	4,370	6,367	1.5%	14%	12%
Mixed Freight	1,602	4,512	4.2%	5	11	3.2%	932	1,553	2.1%	3,319	12,771	5.5%	2,540	6,077	3.6%	8%	11%
Other Agricultural Products, except for Animal Feed	1,350	1,996	1.6%				306	475	1.8%	2,808	4,117	1.5%	1,656	2,471	1.6%	5%	5%
Basic Chemicals	3,184	5,196	2.0%	8	10	1.1%	62	93	1.6%	879	1,667	2.6%	3,254	5,299	2.0%	10%	10%
Fertilizers	3,188	4,625	1.5%	27	15	-2.5%	155	40	-5.2%	620	1,162	2.5%	3,370	4,680	1.3%	10%	9%
Pulp, Newsprint, Paper, and Paperboard	471	837	2.3%				1,141	1,761	1.8%	1,400	1,792	1.0%	1,612	2,597	1.9%	5%	5%
Coal	2,186	2,217	0.1%							178	336	2.6%	2,186	2,217	0.1%	7%	4%
Waste and Scrap	1,535	3,387	3.2%	42	100	3.5%	121	276	3.4%	495	688	1.3%	1,698	3,763	3.2%	5%	7%
Animal Feed and Products of Animal Origin, n.e.c.	216	321	1.6%				7	10	1.3%	1,916	3,426	2.4%	223	332	1.6%	1%	1%
Other Prepared Foodstuffs, and Fats and Oils	796	1,208	1.7%	4	6	1.8%	263	419	1.9%	1,014	1,714	2.1%	1,063	1,632	1.7%	3%	3%
Non-Metallic Mineral Products	306	712	3.4%	169	387	3.4%	584	1,448	3.7%	480	1,043	3.2%	1,059	2,548	3.6%	3%	5%
Base Metal	302	464	1.7%				480	938	2.7%	727	1,180	2.0%	1,509	2,582	2.2%	5%	5%
Coal and Petroleum Products, n.e.c.	684	866	1.0%				90	115	1.0%	713	1,048	1.6%	1,487	2,029	1.3%	5%	4%

Commodity	Inbound			Intra			Outbound			Through			Total w/o Thru			% Total All Commodities	
	2010	2035	CAGR	2010	2035	CAGR	2010	2035	CAGR	2010	2035	CAGR	2010	2035	CAGR	2010	2035
Non-Metallic Minerals, n.e.c.	108	152	1.4%	23	22	-0.2%	76	189	3.7%	887	1,699	2.6%	1,094	2,063	2.6%	3%	4%
Other Commodities	1,977	4,911	3.7%	13	30	3.4%	948	1,470	1.8%	3,041	5,862	2.7%	2,938	6,412	3.2%	9%	12%
Grand Total	23,081	40,317	2.3%	363	753	3.0%	8,786	13,548	1.7%	24,136	55,834	3.4%	32,229	54,618	2.1%	100%	100%

Source: STB Waybill Sample Data for Oregon; FAF3.4 Growth Factors

Current and Future Freight Train Volumes

The degree to which a rail network is used is often characterized by the volume of trains over each segment. Train volumes have a direct bearing on line capacity, as trains comprise the physical unit of movement that must be moved efficiently and safely and in concert with all other trains.

Base and forecast year daily freight train volumes on Class I mainlines were estimated using the Waybill Sample and the FAF forecast was applied to the Waybill Sample using a methodology described in Appendix B. On top of these, the passenger train volumes based on the most recent schedules were overlaid to produce daily total train volumes as shown in Figures 2.17 and 2.18. Figure 2.18 contains only the growth in freight train volumes; it is under a no-build scenario for passenger rail.

From the maps, it is evident that UP's east-west transcontinental corridor and segments of the "Portland Triangle" are the busiest in terms of rail traffic. The traffic on the transcontinental corridor is expected to grow by about 140 percent between 2010 and 2035. Just above 50 percent share of the base year traffic consists of intermodal trains, which is likely to rise to about 70 percent by 2035.

UP's Pacific Northwest corridor between Portland and Eugene shows moderate growth, in the range of 40-50 percent between 2010 and 2035. Although the share of carload trains remains unchanged at about 50 percent, the share of intermodal trains (assuming no change in passenger train frequencies) is projected to increase from about 20 percent to about 26 percent.

The BNSF between North Portland Junction and Vancouver, Washington, which handles UP as well as BNSF traffic, is expected to experience a 100 percent increase on volume. The share of intermodal traffic (again assuming no change in passenger train service) will rise from about 40 percent to 60 percent.

BNSF's Oregon Trunk line carries the lowest volume of rail traffic on the Class I system, all of which is non-intermodal. This ranking is expected to be unchanged in 2035, even with a projected increase in volume of 60 percent.

UP's segment south of Chemult to Klamath Falls, which hosts BNSF as a tenant, is expected to increase about 60 percent. There is likely to be very little change in the relative proportion of intermodal and non-intermodal trains (again assuming no change in the passenger train service).

Figure 2.17 Oregon Train Volumes, 2010

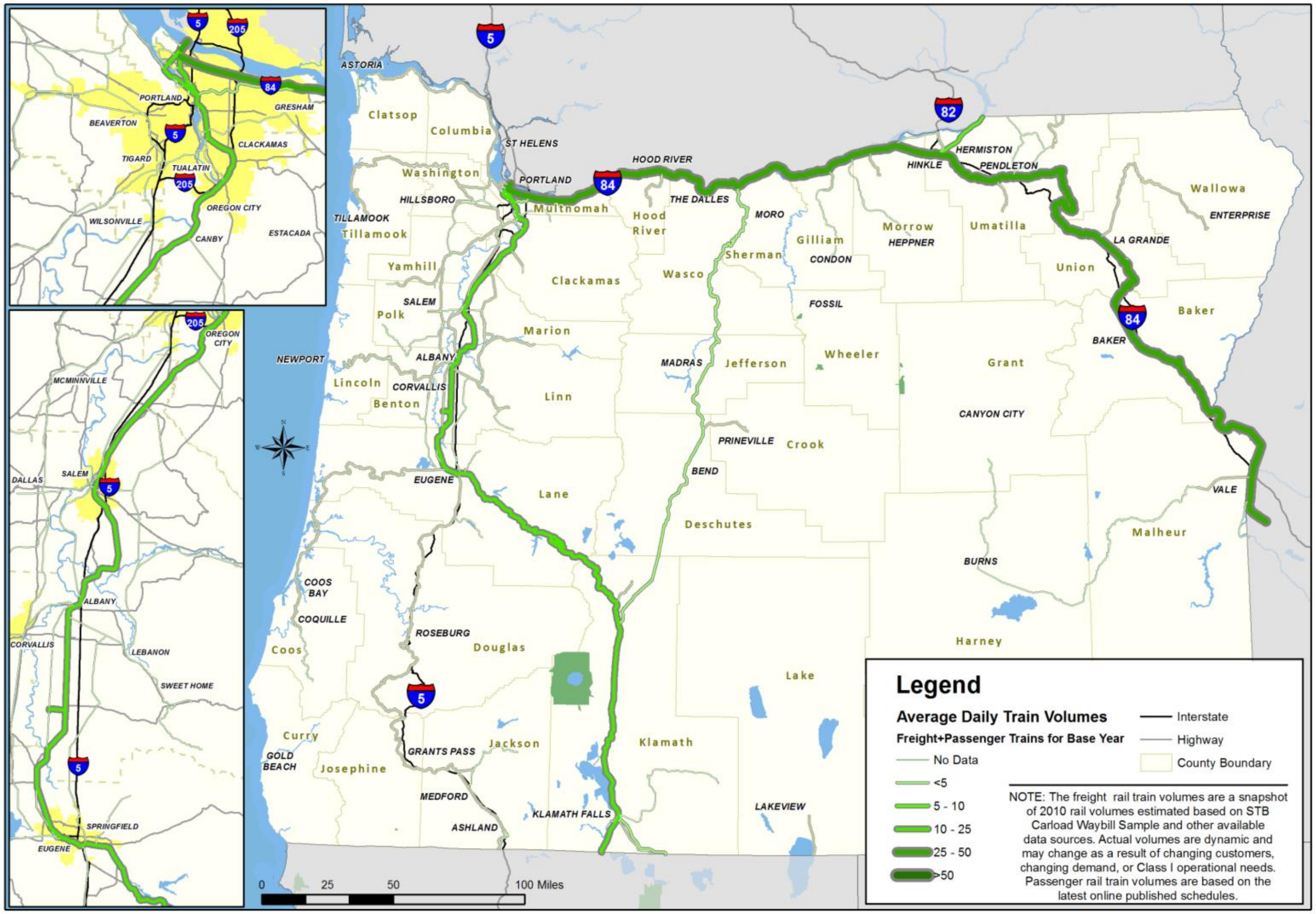
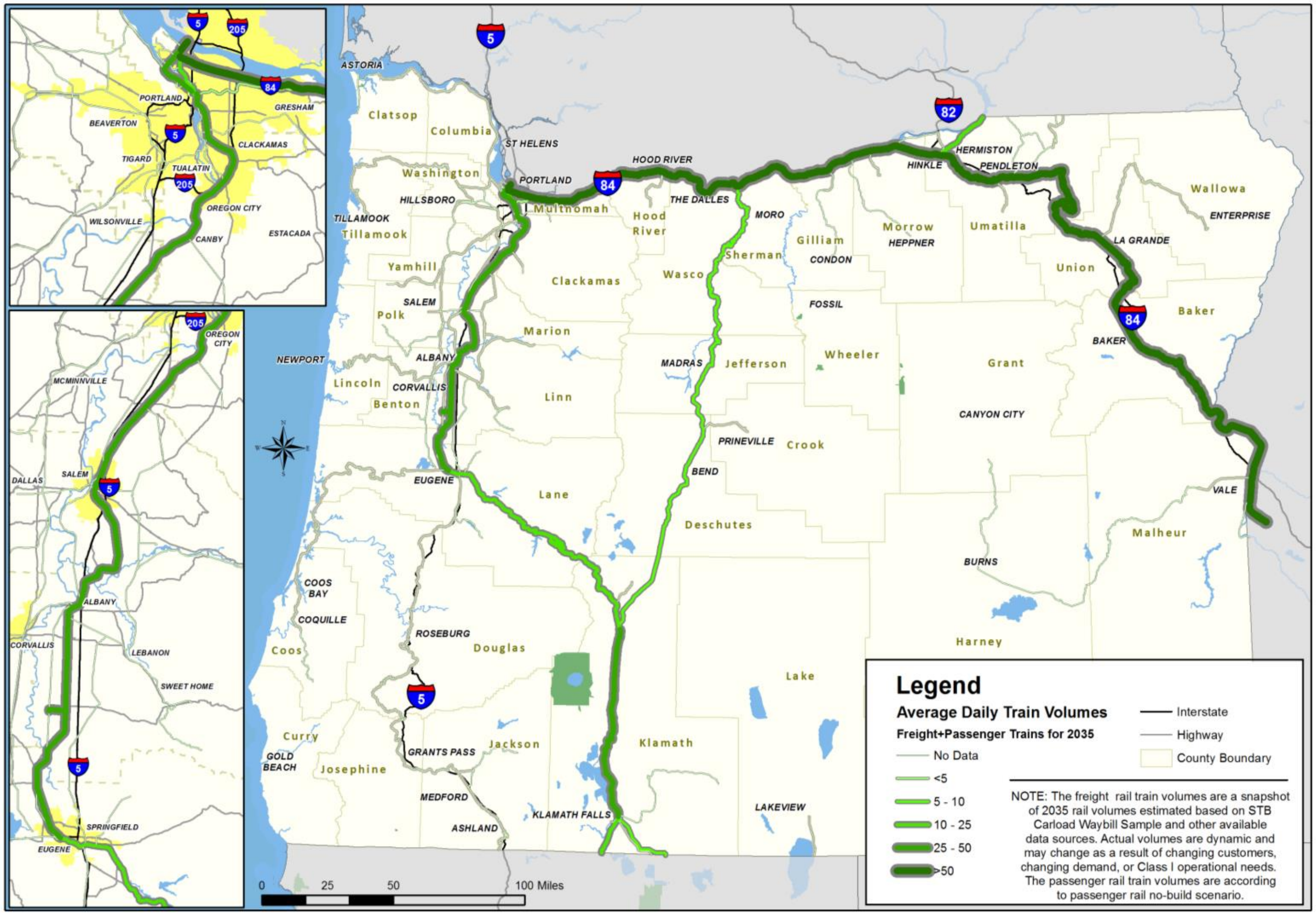


Figure 2.18 Oregon Train Volumes, 2035



3.0 Profile of Passenger Rail System

The Passenger rail system in Oregon links cities and regions within the state and provides connections to locations outside Oregon. The passenger rail system serves business and personal travel needs and supports economic growth within the state. In addition to the local, regional, and statewide importance of these services, the Pacific Northwest Rail Corridor (PNWRC), on which Amtrak's Cascades service travels, is one of ten federally-designated high-speed rail corridors in the country.

The passenger rail system in Oregon has three primary components:

- **Intercity passenger service** connecting urban areas (this category also includes long-distance service that connects communities across state lines).
- **Commuter rail service** within metropolitan regions or between adjacent regions.
- **Urban rail transit service** within a metropolitan area (note: while mentioned for reference, urban rail transit systems are not a component of the State Rail Plan).

This section describes these passenger rail systems that operate in Oregon.

Early History of Passenger Rail Services in Oregon

Passenger rail service began as early as 1887 as the *Oregon Express* (northbound) and the *California Express* (southbound). The late 1800s was a boom time for the construction of passenger rail in Oregon; long-distance trains were introduced to connect Oregon with California as well as to the east along the Columbia River. Today, two key intercity services connect north and south – the *Coast Starlight* and Cascades services and one connects Portland with destinations to the east – the *Empire Builder.*

Rail Services Functional Classification

Intercity passenger rail services provide transportation between metropolitan areas and rural areas within Oregon and to locations outside the state.

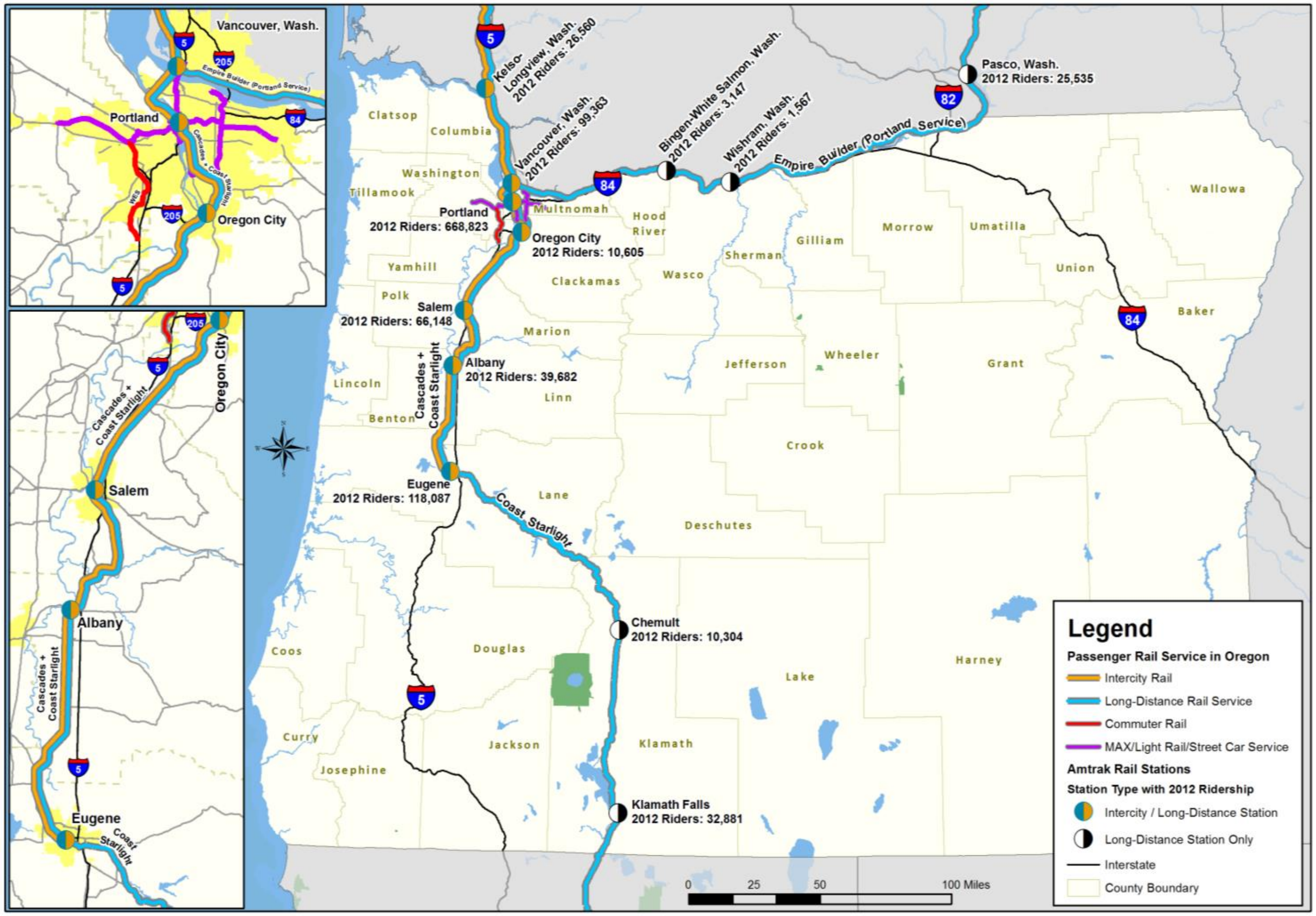
- Shown in Figure 3.1, Amtrak operates three intercity rail services in Oregon:
  - *Empire Builder* route (Chicago – St. Paul/Minneapolis – Milwaukee – Spokane – Portland/Seattle). This long-distance Amtrak system train extends over 2,000 miles from Chicago to the Pacific Northwest. The *Empire Builder* splits in Spokane and terminates in Portland and Seattle,

the route's two western termini. Portland is the only stop for the *Empire Builder* route in Oregon, although stops along the Columbia River at Wishram and Bingham-White Salmon in Washington also provide access for nearby Oregon residents.

  – *Coast Starlight* route (Los Angeles – Oakland – Sacramento – Portland – Seattle). This Amtrak-supported train, which travels over 1,300 miles from Los Angeles to Seattle, is the second most popular long-distance train in the Amtrak system. In Oregon, the *Coast Starlight* stops in Klamath Falls, Chemult, Eugene, Albany, Salem, and Portland.
  – Cascades route (Eugene – Portland – Seattle – Vancouver, BC). The Cascades route serves the Willamette Valley from Eugene to Portland and north to Seattle and Vancouver, B.C. The Cascades travels along the PNWRC, which is one of ten federally-designated high-speed rail (HSR) corridors in the country.

- Commuter rail systems typically provide passenger service within a single region, and service is generally more frequent during peak commuting periods. Westside Express Service (WES) is the only commuter rail system in Oregon. The system serves communities in the Portland metropolitan area and runs between Wilsonville and Beaverton.
- In addition to intercity and commuter rail service, two urban rail systems that provide passenger service within a metropolitan area operate in Oregon. Metropolitan Area Express (MAX) serves the Portland metropolitan area, and the Portland Streetcar provides local service to attractions within downtown Portland. However, this plan only covers intercity and commuter rail services.

Figure 3.1 Intercity Rail Service in Oregon



Source: Cambridge Systematics and Oregon DOT Division of Rail, 2013.

3.1 INTERCITY PASSENGER SERVICE

This section provides information on the Amtrak long-distance and intercity passenger rail corridors that serve Oregon: *Empire Builder*, *Coast Starlight,* and Cascades. Details include operating statistics, station information, and connectivity with other transportation systems.

Amtrak *Empire Builder*

Amtrak operates the *Empire Builder*, a long-distance route that extends from Chicago in the east and splits in Spokane to terminate at the route's two western termini: Portland and Seattle. The southern segment travels through southeastern Washington and the Columbia River Gorge to Portland, which is the route's only stop in Oregon, and the northern segment travels northwest through eastern Washington and the Cascade mountains to Seattle.

The *Empire Builder* route extends 2,255 miles from Portland to Chicago through Spokane, St. Paul/Minneapolis, and Milwaukee and it extends 326 miles between Spokane and Seattle. The *Empire Builder* runs one daily round-trip arriving in Portland in the morning and departing Oregon in the early evening.

The *Empire Builder* uses tracks and right-of-way owned by multiple host railways including BNSF, Minnesota Commercial, Canadian Pacific (CP), Metra, and Portland Terminal Railroad (PTRC). BNSF owns and maintains the track within Oregon and PTRC owns and maintains trackage at Portland's Union Station. Amtrak owns and maintains the train sets. The route's operations and maintenance is funded by ridership revenue and federal subsidies. ODOT does not play a role in funding this service.

Operating Statistics and Performance

This section presents operating statistics and performance data for the *Empire Builder* route. Analysis and the implications of this data are discussed in the *Needs Assessment* Technical Memorandum.

On-Time Performance

Two measures are used to assess a route's on-time performance (OTP): endpoint on-time performance (endpoint OTP) and all-stations on-time performance (all-stations OTP). The two measures are defined as follows:

- **Endpoint OTP** measures whether or not a train arrives at its endpoint on time. An "on-time arrival" is dependent upon trip length. Table 3.1 shows the extra time allowed according to trip length. For example, for trips that are 250 miles or less, a train is considered "on-time" if it arrives within 10 minutes of its scheduled arrival time.

- **All-Stations OTP** compares a train's actual performance to its published schedule, including all stations beginning with the origin and ending with the destination station. The actual departure and actual arrival times are used in this measurement for the specified period. Each departure or arrival constitutes one "instance." A train is considered "on-time" if each instance is within 15 minutes of the schedule. In the case that no time is recorded at a station, that instance is excluded.

Endpoint OTP and All-Stations OTP performance metrics for the *Empire Builder* are defined by PRIIA Section 207 as:

- As of FY 2010, Endpoint OTP must be at least 80 percent;
- By FY 2014, Endpoint OTP must be at least 85 percent;
- Effective FY 2012, All-Stations OTP must be at least 80 percent; and
- By FY 2014, All-Stations OTP must be at least 85 percent.

Table 3.1 Endpoint OTP On-Time Arrival Standards

Trip Length	Time Allowed (After Scheduled Arrival)
250 miles or less	10 minutes
251-350 miles	15 minutes
351-450 miles	20 minutes
451-550 miles	25 minutes
551 or more miles	30 minutes

Source: Federal Railroad Administration. (2012). Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations, June 2012.

Table 3.2 displays Amtrak *Empire Builder*'s OTP performance for FY 2012. Amtrak did not meet PRIIA's 80 percent OTP performance target. During this time, *Empire Builder* service has been affected by weather-related events such as flooding and mudslides, which caused service to be truncated and thus negatively affected performance in some cases.

Table 3.2 Amtrak *Empire Builder* On-Time Performance by Quarter (October 2011 – December 2012)

Month	Endpoint OTP	All-Stations OTP
October-December 2011 (Q1)	**66.2%**	**43.9%**
January-March 2012 (Q2)	**73.8%**	**62.6%**
April-June 2012 (Q3)	**69.0%**	**45.4%**
July-September 2012 (Q4)	**33.1%**	**24.5%**
October-December 2012 (Q1)	**60.6%**	**39.9%**

Note: Values that do not meet standard defined by Section 207 of PRIIA (80 percent) are **bold**.

Source: FRA, *Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations*. Multiple reports were consulted: Quarter Ended December 2012 – Quarter Ended December 2013. Accessed May 2013 from http://www.fra.dot.gov/Page/P0532.

Delay

In addition to OTP, delay information is an important performance measure for passenger rail services. To determine this measure for each train route, Amtrak calculates the total train delays per 10,000 train miles.[39] Additionally, Amtrak provides the top two causes of delay. These data are then presented by train route on a quarterly basis and compared to the delay standards. These standards from the PRIIA, Section 207 state that host-responsible delays must be no greater than 900 minutes per 10,000 train-miles and Amtrak-responsible delays must be no greater than 325 minutes per 10,000 train-miles. Delay information for the *Empire Builder* is summarized in Table 3.3.

Table 3.3 shows the *Empire Builder's* performance of the during the FY 2012 for host-railroad responsible delays and Amtrak-responsible delays systemwide. *Empire Builder* performed well with regard to delays, meeting the standard in all but three instances. But, the *Empire Builder* did not meet the standards for host- or Amtrak-responsible delays during the fourth quarter of FY 2012. Freight train interference and temporary slow orders are the most frequent types of host-responsible delays during this time. The most frequent Amtrak-responsible delays include passenger-related delays (e.g., checked baggage and large groups) and delays resulting from holding the train for connections from other trains or buses.

[39] Amtrak reports these data to the FRA. The host railroads are not involved in this process. Amtrak reports delays regardless of whether or not the train is able to make up time for these delays in other areas of the route.

Table 3.3 Delay Information for Amtrak *Empire Builder** (October 2011 – December 2012)

	Host-Responsible Delays[a]			
Quarter	Host Railroad	Top Two Reasons for Host-Responsible Delays	Amtrak-Responsible Delays[a]	Top Two Reasons for Amtrak-Responsible Delays
October - December 2011 (Q1)	818	Delays from freight trains, temporary slow orders	313	Passenger-related (all passengers – checked baggage, etc.), Holding for connections from other trains or buses
January - March 2012 (Q2)	657	Delays from freight trains, temporary slow orders	272	Passenger-related (all passengers – checked baggage, etc.), Holding for connections from other trains or buses
April-June 2012 (Q3)	706	Delays from freight trains, temporary slow orders	307	Passenger-related (all passengers – checked baggage, etc.), Holding for connections from other trains or buses
July - September 2012 (Q4)	**1170**	Delays from freight trains, temporary slow orders	**638**	Passenger-related (all passengers – checked baggage, etc.), Holding for connections from other trains or buses
October - December 2012 (Q1)	**911**	Delays from freight trains, temporary slow orders	321	Passenger-related (all passengers – checked baggage, etc.), Holding for connections from other trains or buses

Notes: Values that do not meet the standards defined by Section 207 of PRIIA are **bold**.

* Delay performance is only provided for railroads that host passenger rail service in Oregon.

[a] Delay is displayed in minutes of delay per 10,000 train-miles.

Source: FRA, *Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations*. Multiple reports were consulted: Quarter Ended December 2012 – Quarter Ended December 2013. Accessed May 2013 from http://www.fra.dot.gov/Page/P0532.

Amtrak *Coast Starlight*

Amtrak operates the *Coast Starlight*, a long-distance intercity route that extends 1,377 miles from Los Angeles to Seattle. Service includes one daily round-trip train, and the route serves six stations in Oregon, including Klamath Falls, Chemult, Eugene, Albany, Salem, and Portland. Travel time along the Oregon portion of this route is approximately 8 hours.

The *Coast Starlight* uses tracks and rights-of-way in Oregon that are owned by BNSF and UP. Within Oregon, UP owns and maintains most of the tracks and right-of-way, except the segment between Portland Union Station and the Washington state line, which is owned and maintained by BNSF. Similar to the *Empire Builder* route, *Coast Starlight* is supported by ridership revenue and federal subsidies. ODOT does not have a role in funding this service. At Portland Union Station, Portland Terminal Railroad owns and maintains some trackage.

Operating Statistics and Performance

This section presents operating statistics and performance data for the *Coast Starlight* route. Analysis and the implications of this data are discussed in the *Needs Assessment* Technical Memorandum.

On-Time Performance

Endpoint OTP and All-Stations OTP[40] performance metric requirements for the *Coast Starlight* are the same as those on the *Empire Builder*. Table 3.4 displays the *Coast Starlight*'s on-time performance information for FY 2012.

[40] OTP and All-Stations OTP are both defined in *Empire Builder* section.

Table 3.4 Amtrak *Coast Starlight* On-Time Performance by Quarter (October 2011 to December 2012)

Month	Endpoint OTP	All-Stations OTP
October-December 2011 (Q1)	85.9%	**71.8%**
January-March 2012 (Q2)	**78.0%**	**61.0%**
April-June 2012 (Q3)	**79.7%**	**61.7%**
July-September 2012 (Q4)	**72.3%**	**50.7%**
October-December 2012 (Q1)	**73.9%**	**53.5%**

Note: Values that do not meet standard defined by Section 207 of PRIIA (80 percent) are **bold**.

Source: FRA, *Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations*. Multiple reports were consulted: Quarter Ended December 2012 – Quarter Ended December 2013. Accessed April 2013 from http://www.fra.dot.gov/Page/P0532.

In all but one instance, the *Coast Starlight* did not meet the standards for Endpoint OTP and All-Stations OTP during FY 2012. The *Coast Starlight* met the standard for Endpoint OTP during the first quarter of FY 2012. The service degraded in the second quarter, during which the endpoint OTP dropped roughly eight percentage points, and All-Stations OTP dropped roughly 11 percentage points.

Delay

Table 3.5 shows the performance of the *Coast Starlight*, operated by Amtrak, during the FY 2012 for host-responsible delays on track in Oregon and Amtrak-responsible delays systemwide. *Coast Starlight* did not meet PRIIA's service delay performance targets[41] for either host-railroad or Amtrak-responsible delays on *Coast Starlight*. The top causes of host-responsible delays were passenger train interference which includes meeting or following other passenger trains, commuter train interference which involves meeting or following commuter trains, and signal delays. The most frequent Amtrak-responsible delays on the *Coast Starlight* route during FY 2012 were passenger-related delays.

[41] These standards from PRIIA, Section 207 state that host-responsible delays must be no greater than 900 minutes per 10,000 train-miles and Amtrak-responsible delays must be no greater than 325 minutes per 10,000 train-miles.

Table 3.5 Delay Information for Amtrak *Coast Starlight** (October 2011 – December 2012)

Quarter	Host-Responsible Delays[a] Host Railroad BNSF	Host-Responsible Delays[a] Host Railroad UP	Top Two Reasons for Host-Responsible Delays BNSF	Top Two Reasons for Host-Responsible Delays UP	Amtrak-Responsible Delays[a]	Top Two Reasons for Amtrak-Responsible Delays
October - December 2011 (Q1)	**952**	**908**	Routing-dispatching delays (including diversions, late track bulletins), Delays from freight trains	Delays for meeting or following other passenger trains, Signal delays	**494**	Crew and system-related (lateness, lone-engineer delays), Passenger-related (all passengers – checked baggage, etc.)
January - March 2012 (Q2)	**1,058**	**1,027**	Temporary slow orders, Routing-dispatching delays (including diversions, late track bulletins)	Delays for meeting or following other passenger trains, Signal delays	**496**	Crew and system-related (lateness, lone-engineer delays), Locomotive failure
April-June 2012 (Q3)	**920**	**1,014**	Temporary slow orders, Routing-dispatching delays (including diversions, late track bulletins)	Delays for meeting or following other passenger trains, Signal delays	**505**	Passenger-related (all passengers – checked baggage, etc.), All switching and service delays
July - September 2012 (Q4)	**1,188**	**1,134**	Temporary slow orders, Delays for meeting or following other passenger trains	Delays for meeting or following other passenger trains, Signal delays	**618**	Passenger-related (all passengers – checked baggage, etc.), All switching and service delays
October - December 2012 (Q1)	893	**1,135**	Delays from freight trains, temporary slow orders	Delays for meeting or following other passenger trains, Signal delays	**568**	Passenger-related (all passengers – checked baggage, etc.), All switching and service delays

Notes: Values that do not meet the standards defined by Section 207 of PRIIA are **bold**.

* Delay performance is only provided for railroads that host passenger rail service in Oregon.

[a] Delay is displayed in minutes of delay per 10,000 train-miles.

Source: FRA, *Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations*. Multiple reports were consulted: Quarter Ended December 2012 – Quarter Ended December 2013. Accessed May 2013 from http://www.fra.dot.gov/Page/P0532.

Amtrak Cascades

Amtrak operates the Cascades, an intercity rail service that extends 467 miles from Eugene, Oregon to Vancouver, British Columbia. The average speed on the 124 miles between Portland and Eugene is 42 miles per hour (mph). The scheduled travel time between the two cities is two hours and 35 minutes.

In Oregon, Cascades operates on the same corridor as *Coast Starlight*. The route uses tracks and right-of-way in Oregon that are owned by multiple host railways, including BNSF and UP. Within Oregon, UP owns and maintains most of the tracks and right-of-way, except the segment between Portland Union Station and the Washington state line, which is owned and maintained by BNSF.

As of June 2013, Amtrak Cascades daily service included the following trains, all of which make local stops (see Table 3.6 for detailed schedule information):

- Three daily trains run between Eugene and Seattle, one northbound (Train 500) and two southbound (Trains 507 and 509).
- Three daily trains run between Portland and Seattle, two northbound (Trains 506 and 508) and one southbound (Train 501);
- Two daily trains run between Portland and Vancouver, B.C., one northbound (Train 516) and one southbound (Train 513);
- Two daily trains run between Seattle and Vancouver, B.C., one northbound (Train 510) and one southbound (Train 517); and
- One daily northbound train runs between Eugene and Portland (Train 504).

Table 3.6 Amtrak Cascades Daily Schedule (Major Stations)

Northbound	Eugene-Departs	Portland - Arrives	Portland - Departs	Seattle- Arrives	Seattle- Departs	Vancouver, B.C.-Arrives
510					7:40 a.m.	11:40 a.m.
500	5:30 a.m.	8:05 a.m.	8:30 a.m.	12:00 p.m.		
504	9:00 a.m.	11:35 a.m.				
506			12:15 p.m.	3:45 p.m.		
516			2:50 p.m.	6:20 p.m.	6:50 p.m.	10:50 p.m.
508			6:15 p.m.	9:45 p.m.		
Southbound	**Vancouver, B.C.– Departs**	**Seattle- Arrives**	**Seattle- Departs**	**Portland - Arrives**	**Portland - Departs**	**Eugene – Arrives**
501			7:30 a.m.	11:00 a.m.		
513	6:40 a.m.	11:05 a.m.	11:25 a.m.	2:55 p.m.		
507			2:20 p.m.	5:50 p.m.	6:15 p.m.	8:50 p.m.
509			5:30 p.m.	9:00 p.m.	9:10 p.m.	11:45 p.m.
517	5:45 p.m.	10:10 p.m.				

Note: This schedule includes train service only, as of June 2013. *Thruway* bus service is not included. Schedule changes are planned for July 2013. Source: Amtrak. (2012). Amtrak Cascades Schedules. http://www.amtrakcascades.com/Schedules.htm

The cost of Cascades service is currently shared by Washington, Oregon, and Amtrak. Additional costs will be incurred as a result of PRIIA beginning October 1, 2013. Between 2011 and 2013, Washington paid approximately 50 percent, Oregon contributed approximately 30 percent, and Amtrak contributed approximately 20 percent of the needed operating subsidy. Under PRIIA, Washington DOT and Oregon DOT will be required to fund approximately 87 percent of the routes total operating costs.[42] Ticket revenues provide approximately 60 percent of Amtrak Cascades' operating costs for the entire corridor and 40 percent the entire corridor's operating costs and 40 percent of Oregon's service costs.[43] The remaining share of the system's funding comes from public subsidies provided by Washington, Oregon, and Amtrak. Although the changes effected by PRIIA will require states to provide more funding, they also allow states greater control over operational and business decisions, costs, and revenues.[44] Washington and Oregon have committed funding toward specific capital improvements to support Amtrak Cascades. For example, to ensure continued high levels of intercity rail service, Oregon acquired two additional train sets that are expected to begin operating along the Cascades corridor in Summer 2013.

Operating intercity trains such as the Cascades involves a number of public and private entities in the U.S. and Canada including: WSDOT; ODOT; the British Columbia Ministry of Transportation and Infrastructure (BCMoTI); Amtrak; BNSF; UPRR; customs and border control agencies; and Talgo, a train manufacturer and maintenance provider. To ensure that Amtrak Cascades operates smoothly, these entities are involved in partnerships and agreements with one another. While the *Cascades Rail Corridor Management Workplan* (January 2013) provides complete details on all corridor partnerships, the partnerships most relevant to ODOT and this SRP are summarized below.

First, to provide context, the ODOT Rail Division is responsible for the following activities related to Amtrak Cascades: management of Amtrak Cascades service operations, rail service planning and projects, contracting for train and motor coach services, management of passenger rail assets owned by ODOT, completion of projects from federal high-speed rail dollars, and ensuring passenger safety on trains and public safety at crossings.[45]

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42 WSDOT and ODOT. (2013). Cascades Rail Corridor Management Workplan: January 2013.

43 Based on forecasted figures for the Fiscal Year 2014 from the Amtrak Financial Analysis, Business Line Planning Strategy.

44 WSDOT and ODOT. (2013). Cascades Rail Corridor Management Workplan: January 2013.

45 WSDOT and ODOT. (2013). Cascades Rail Corridor Management Workplan: January 2013.

ODOT's current agreements[46] are described below, listed by partner:

- **Amtrak** – ODOT has an agreement with Amtrak to operate Amtrak Cascades in Oregon. Service includes two daily round trips between Portland and Eugene.[47]
- **Portland Development Commission –** ODOT has an agreement with the Portland Development Commission to oversee investments from the American Recovery and Reinvestment Act related to Portland Union Station.
- **Talgo** – ODOT plans to enter into an agreement with Talgo, the original equipment manufacturer of Amtrak Cascades trains, to maintain and upgrade the Talgo trainsets scheduled to come on the line in summer 2013.

In 2012, WSDOT signed an agreement with ODOT to facilitate an integrated corridor management approach, allowing both parties to jointly develop a plan for the PNWRC, with the intention of adding British Columbia as another partner. [48]

In concept, the entire PNWRC would be operated as one integrated corridor rather than operating Amtrak Cascades service in separate segments according to jurisdiction, as is current practice. A set of common goals will be developed with an aim to share resources across the entire corridor. Potential benefits include financial and labor efficiencies gained by pooling resources, the strengthening of the corridor's position in negotiations with contractors and in its work with federal agencies, improved service, and reduced taxpayer subsidies.[49]

Operating Statistics and Performance

This section presents operating statistics and performance data for the Cascades route. Analysis and the implications of this data are discussed in the *Needs Assessment* Technical Memorandum.

The performance metrics for the Amtrak Cascades service are different from *Empire Builder* and *Coast Starlight*. As part of a Federal High-Speed Intercity Passenger Rail grant, by 2017, Washington DOT will achieve the following:

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46 WSDOT has separate agreements in place that guide the provision of *Cascades* rail service. These agreements are described in the *Cascades Rail Corridor Management Workplan: January 2013*.

47 WSDOT and ODOT. (2013). Cascades Rail Corridor Management Workplan: January 2013.

48 Ibid.

49 Ibid.

- Ten-minute reduction in the run time shown in the public schedule for the Amtrak Cascades service operating between Seattle and Portland;
- Two additional daily round-trip Amtrak Cascades corridor service intercity passenger trains operating between Seattle and Portland; and
- Improvement in Amtrak Cascades on-time performance to 88 percent.

On-Time Performance

This section describes the Cascades route's OTP as tracked by Amtrak and ODOT. The data collected and maintained by each agency measures the Cascades' OTP differently. Amtrak measures Endpoint OTP and All-Stations OTP data for stations throughout the corridor, which extends outside of Oregon. This data measures OTP along the corridor, but does not provide a refined picture of the Cascades' performance within Oregon. To gauge this, ODOT measures OTP in the Portland-Eugene corridor. This section discusses the OTP performance data maintained by both Amtrak and ODOT. Amtrak's Endpoint OTP and All-Stations OTP[50] performance metrics for the Cascades are the same as those on other routes. Table 3.7 displays the Cascades' on-time performance information for FY 2012.

Table 3.7 Amtrak Cascades On-Time Performance by Quarter (October 2011 to December 2012)

Month	Endpoint OTP	All-Stations OTP
October-December 2011 (Q1)	**77.6%**	80.3%
January-March 2012 (Q2)	**69.3%**	**75.8%**
April-June 2012 (Q3)	**75.8%**	**81.4%**
July-September 2012 (Q4)	**73.4%**	**77.4%**
October-December 2012 (Q1)	81.2%	81.3%

Note: Values that do not meet standard defined by Section 207 of PRIIA (80 percent) are **bold**.

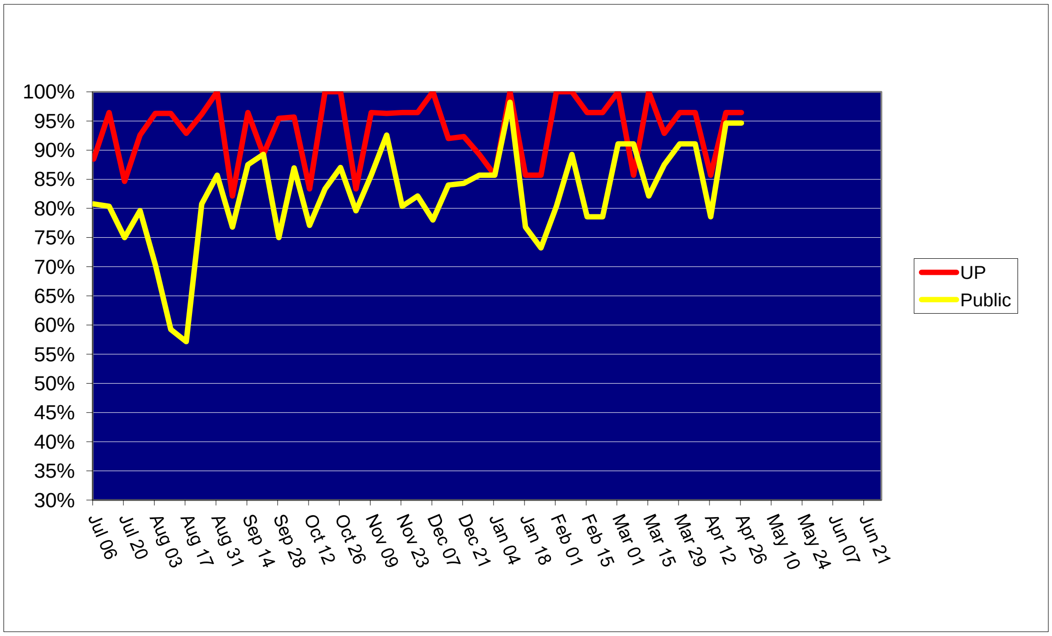
Source: FRA, *Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations*. Multiple reports were consulted: Quarter Ended December 2012 – Quarter Ended December 2013. Accessed May 2013 from http://www.fra.dot.gov/Page/P0532.

Shown in Figure 3.2, ODOT tracks two OTP metrics along the Cascades route between Portland and Eugene: (1) UP OTP, which measures the percentage of trains that do not exceed travel times of 2 hours and 45 minutes between Portland and Eugene (a scheduled run time of 2 hours and 35 minutes plus 10

[50] OTP and All-Stations OTP are both defined in Empire Builder section.

minutes tolerance); and (2) Public OTP, which measures the percent of trains that depart on time and arrive within 10 minutes of the time printed on the public schedule. For the portion of the route between Portland and Eugene, the Cascades route's UP OTP generally ranged between 85 and 100 percent between July 2012 and April 2013. Public OTP along this section of the Cascades primarily ranged between 75 and 90 percent. Generally, the Cascades' service achieved better OTP within Oregon than it did corridor wide during this time period.

Figure 3.2 Amtrak Cascades On-Time Performance in Oregon (July 2012-April 2013)



Source: ODOT, 2013.

Notes: Includes OTP for northward trains 500 and 504 and southward trains 507 and 509.

OTP was measured weekly between July 2012 and April 2013.

UP measures the percentage of time that Cascades trains travel between Portland and Eugene within 2 hours and 45 minutes, or less.

Public measures the percent of trains between Portland and Eugene that depart on time and arrive at the other city within 10 minutes of the time printed on the public timetable.

Delay

Table 3.8 shows the performance of the Cascades, operated by Amtrak, during FY 2012 for host- responsible delays on track in Oregon and Amtrak-responsible delays systemwide. Cascades performed well with regard to Amtrak-responsible delays. But BNSF generally did not meet PRIIA standards for host-responsible delays. During this time period, UPRR met the standards in each quarter except the second.[51] The most frequent reason for host railroad-related delay is freight train interference, and the most common Amtrak-related delays are locomotive failure, crew and system-related delays, and passenger-related incidents.

[51] These standards from PRIIA, Section 207 state that host-responsible delays must be no greater than 900 minutes per 10,000 train-miles and Amtrak-responsible delays must be no greater than 325 minutes per 10,000 train-miles.

Table 3.8 Delay Information for Amtrak Cascades (October 2011 – December 2012)

Quarter	Host-Responsible Delays[a] Host Railroad BNSF	Host-Responsible Delays[a] Host Railroad UP	Top Two Reasons for Host-Responsible Delays BNSF	Top Two Reasons for Host-Responsible Delays UP	Amtrak-Responsible Delays[a]	Top Two Reasons for Amtrak-Responsible Delays
October - December 2011 (Q1)	**1,045**	7123	Delays from freight trains, Delays for meeting or following other passenger trains	Delays from freight trains, Signal delays	232	Locomotive failure, Passenger-related
January - March 2012 (Q2)	**1,270**	**993**	Temporary slow orders, Delays from freight trains,	Delays from freight trains, Signal delays	224	Crew and system-related (lateness, lone-engineer delays), Locomotive failure
April-June 2012 (Q3)	**1,162**	784	Temporary slow orders, Delays from freight trains,	Delays from freight trains, Signal delays	227	Passenger-related (all passengers – checked baggage, etc.), Crew and system-related (lateness, lone-engineer delays)
July - September 2012 (Q4)	**1,149**	777	Temporary slow orders, Delays from freight trains,	Delays from freight trains, Signal delays	296	Locomotive failure. Passenger-related (all passengers – checked baggage, etc.)
October - December 2012 (Q1)	**1,067**	680	Temporary slow orders, Delays from freight trains,	Delays from freight trains, Signal delays	281	Locomotive failure. Passenger-related (all passengers – checked baggage, etc.)

Source: FRA, *Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations*. Multiple reports were consulted: Quarter Ended December 2012 – Quarter Ended December 2013. Accessed May 2013 from http://www.fra.dot.gov/Page/P0532.

Note: Values that do not meet the standards defined by Section 207 of PRIIA are **bold**.

[a] Delay is displayed in minutes of delay per 10,000 train-miles.

Amtrak Station Characteristics and Connections

The *Empire Builder, Coast Starlight,* and Cascades serve seven Amtrak stations in Oregon. Table 3.9 shows the Amtrak routes that serve each station. Table 3.10 summarizes station characteristics including physical location, parking supply, and rail and bus connections.

At Portland Union Station, passengers may transfer between the *Empire Builder, Coast Starlight,* and Cascades services. Passengers can make connections to other regions in Oregon by transferring to the Cascades or *Coast Starlight* services. Connections can be made to locations outside of the state by transferring to the *Empire Builder*, which runs between Portland and Chicago, or the *Coast Starlight,* which runs between Los Angeles and Seattle.

Thruway bus service, discussed in greater detail in Section 3.2, provides additional connections and enhanced service frequency for passengers making connections, and passengers can make connections from Amtrak trains to locations throughout the Portland metropolitan area on the MAX urban rail transit system. MAX Green and Yellow Lines directly serve Union Station.

Table 3.9 Amtrak Stations by Route

Stations	*Empire Builder*	*Coast Starlight*	Cascades
Portland Union	✓	✓	✓
Oregon City			✓
Salem		✓	✓
Albany		✓	✓
Eugene (Eugene-Springfield)		✓	✓
Chemult		✓	
Klamath Falls		✓	

Source: www.amtrak.com

Table 3.10 Amtrak Station Characteristics

Station	Location	Parking Supply	Rail/Transit Connections	*Thruway* Bus Connections	Local Transit Service
Portland Union Station	800 NW Sixth Avenue Portland, OR	200 long-term and 25 short-term parking spaces	Amtrak *Empire Builder*, Amtrak *Coast Starlight*, Amtrak Cascades, MAX Green Line, MAX Yellow Line, Greyhound	Cascades POINT *Thruway* Bus, Portland-Albany-Corvallis-Newport (Valley Retriever), Northwest POINT/*Thruway*	TriMet
Oregon City Platform (No Shelter)	1757 Washington Street Oregon City, OR	50 long-term parking spaces	Amtrak Cascades		TriMet
Salem Station	500 13th Street SE Salem, OR	30 long-term and 30 short-term parking spaces	Amtrak *Coast Starlight*, Amtrak Cascades, Greyhound (future)	Cascades POINT *Thruway* Bus	Salem-Keizer Transit
Albany Station	110 10th Avenue SW Albany, OR	50 long-term and 20 short-term parking spaces	Amtrak *Coast Starlight*, Amtrak Cascades, Greyhound	Cascades POINT *Thruway* Bus, Portland-Albany-Corvallis-Newport (Valley Retriever)	Albany Transit System
Eugene Station	433 Willamette Street Eugene, OR	25 long-term and 8 short-term parking spaces	Amtrak *Coast Starlight*, Amtrak Cascades, Greyhound	Cascades POINT *Thruway* Bus, Eugene-Bend-Ontario-Coos Bay	Lane Transit District
Chemult Platform (With Shelter)	Palmer/Kranz Street and Depot Street Off Highway 97 Chemult, OR	25 long-term and 25 short-term parking spaces	Amtrak *Coast Starlight*	Redmond-Bend-Chemult (HighDesert POINT *Thruway*)	
Klamath Falls Station	1600 Oak Avenue Klamath Falls, OR	60 long-term and 20 short-term parking spaces	Amtrak *Coast Starlight,* Greyhound	Brookings-Medford-Klamath Falls (South-West POINT)	Basin Transit Service

Source: www.amtrak.com.

3.2 AMTRAK *THRUWAY* & CONNECTING BUS SERVICE

A network of intercity bus lines in Oregon provides connections to Amtrak's intercity rail service and to destinations throughout the state. Some of these services are state contracted and subsidized services, and others are privately operated. Table 3.11 shows the main Amtrak *Thruway* and connecting intercity bus services, the name of the operator, and whether it is financially supported by ODOT.

ODOT and Oregon's regional transit agencies oversee the Public Oregon Intercity Transit (POINT) program, which consolidates the branding of several intercity bus services in Oregon, many of which are operated by private entities. At this time, POINT services include NorthWest POINT, SouthWest POINT, and HighDesert POINT. The Cascades *Thruway* bus operation will soon be operated under the POINT program and will be renamed Cascades POINT.

Table 3.11 Amtrak *Thruway* and Connecting Intercity Bus Service

Route	Name	Operator	Funding Source
Portland-Eugene	Cascades *Thruway* [a]	MTR Western (GTO LLC)	ODOT
Portland-Astoria	NorthWest POINT	MTR Western (GTO LLC)	ODOT
Portland-Bend-Newport	Valley Retriever	Valley Retriever Bus Lines	Private
Brookings-Klamath Falls	SouthWest POINT	Shuttle Inc.	ODOT
Coos Bay-Eugene	Porter Stage	Porter Stage	Private
Eugene-Bend	Eugene-Bend	TAC Transportation	Private
Redmond-Chemult	HighDesert POINT	TAC Transportation.	ODOT
Bend-Ontario	Eastern POINT	TAC Transportation.	ODOT

Source: ODOT Rail Division, 2013.

[a] The Cascades *Thruway* bus service will soon be operated under the POINT program and will be re-named Cascades POINT.

Figure 3.3 shows a map of the *Thruway* bus routes in Oregon, and Table 3.12 shows the connections between Oregon's *Thruway* bus service and Amtrak intercity rail services.

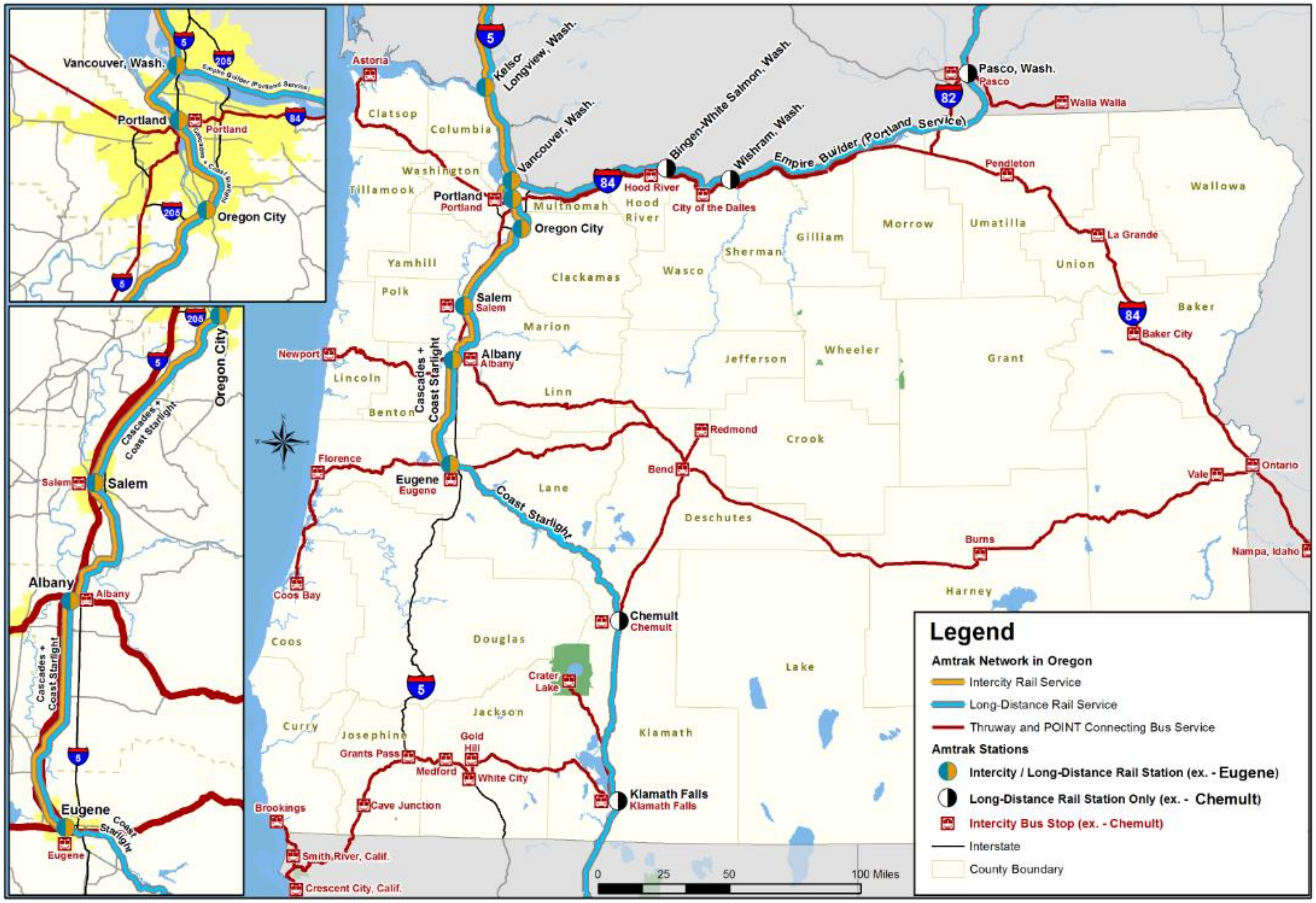
Table 3.13 shows the each Amtrak *Thruway* and connecting intercity bus service ridership figures during the 2012 calendar year.

Table 3.12 Amtrak *Thruway* and Other Bus and Intercity Rail Connections

Route	Name	Connects to Amtrak Rail	Intercity Rail Route	Amtrak Station
Portland-Eugene	Cascade POINT/*Thruway*	✓	Cascades, *Coast Starlight, Empire Builder*	Portland Union Station, Salem Station, Albany Station, Eugene Station
Portland-Astoria	NorthWest Point	✓	Cascades, *Coast Starlight, Empire Builder*	Portland Union Station
Portland-Bend-Newport	Valley Retriever	✓	Cascades, *Coast Starlight, Empire Builder*	Portland Union Station, Salem Station, Albany Station
Brookings-Klamath Falls	SouthWest Point	✓	*Coast Starlight*	Klamath Falls Station
Coos Bay-Eugene	Porter Stage Lines	✓	Cascades, *Coast Starlight*	Eugene Station
Eugene-Bend	TAC Transportation	✓	Cascades, *Coast Starlight*	Eugene Station
Redmond-Chemult	HighDesert POINT	✓	*Coast Starlight*	Chemult Station
Bend-Ontario	Eastern POINT			

Source: ODOT Rail Division, 2013.

Figure 3.3 *Thruway* Bus Service in Oregon



Source: Amtrak

Note: SouthWest, NorthWest, and HighDesert intercity bus services are POINT program services. Cascades *Thruway* will also soon be managed under the POINT program.

Table 3.13 Amtrak *Thruway* and Connecting Intercity Bus Service Ridership*

	Portland-Eugene	Portland-Astoria	Portland-Bend-Newport[1]	Brookings-Klamath Falls[2]	Coos Bay-Eugene[1]	Eugene-Bend[1]	Redmond-Chemult	Bend-Ontario
January 2012	5,600	1,400	n/a	600	n/a	n/a	400	200
February 2012	5,300	1,500	n/a	600	n/a	n/a	300	200
March 2012	6,400	1,800	n/a	800	n/a	n/a	400	300
April 2012	6,000	1,700	n/a	600	n/a	n/a	300	200
May 2012	6,300	1,800	n/a	700	n/a	n/a	300	300
June 2012	6,100	1,900	n/a	800	n/a	n/a	400	400
July 2012	5,900	2,200	n/a	800	n/a	n/a	400	400
August 2012	6,100	2,400	n/a	900	n/a	n/a	400	400
September 2012	5,600	2,000	n/a	700	n/a	n/a	400	300
October 2012	6,200	1,700	n/a	700	n/a	n/a	400	300
November 2012	7,500	1,600	n/a	800	n/a	n/a	500	300
December 2012	6,400	1,700	n/a	1,000	n/a	n/a	700	400
2012 Calendar Year	**73,400**	**21,700**	**n/a**	**9,000**	**n/a**	**n/a**	**4,900**	**3,700**

Notes: * Figures rounded to the nearest hundred.

1. Ridership figures are not available for private routes.

2. Pending data confirmation.

Source: ODOT Rail Division, 2013.

3.3 Commuter Rail

Regional, or commuter, rail systems typically offer passenger service within a single region, and occasionally between regions. The Westside Express Service (WES), the only commuter rail service in Oregon, has served commuters in the Portland metropolitan area since February 2009. WES operates Monday through Friday and serves five stations in the Portland metropolitan area: Beaverton, Hall/Nimbus, Tigard, Tualatin, and Wilsonville. Figure 3.4 shows a map of WES's service area in the context of the Portland area rail network.

WES runs 16 round trip trains each weekday with eight roundtrips during the morning and evening commute period. Trains run every 30 minutes during rush hour, and the travel time between Beaverton and Wilsonville is just under a half hour.

WES operates on 14.7 miles of track. Portland & Western Railroad owns the freight rail tracks that WES uses and it operates the trains under contract.[52] The service is sponsored by TriMet, which is governed by a seven-member board of directors appointed by the Governor of Oregon.

TriMet publishes ridership and performance statistics on a monthly basis. Table 3.14 shows total boardings, passenger miles, and the farebox recovery ratio since WES operations began.

WES provides direct connections to Portland's MAX light rail service. Passengers can transfer from WES commuter rail service to the MAX Red and Blue Lines at the Beaverton Transit Center. MAX provides connections to Amtrak's Cascades, *Coast Starlight*, or *Empire Builder* routes at Union Station in Portland as well as the Portland International Airport and other destinations in and around Portland.

[52] TriMet. (2012). WES Commuter Rail Tour Factsheet.

Table 3.14 WES Ridership, System Characteristics, and Performance, FY2009- 2012

Year[1]	Originating Rides	Boarding Rides	Passenger Miles	Fare Recovery Ratio[3]
2009[2]	97,180	124,346	1,073,106	4.6%
2010	239,519	305,844	2,553,797	5.2%
2011	289,980	370,800	3,103,596	6.6%
2012	326,910	418,090	3,428,338	7.4%

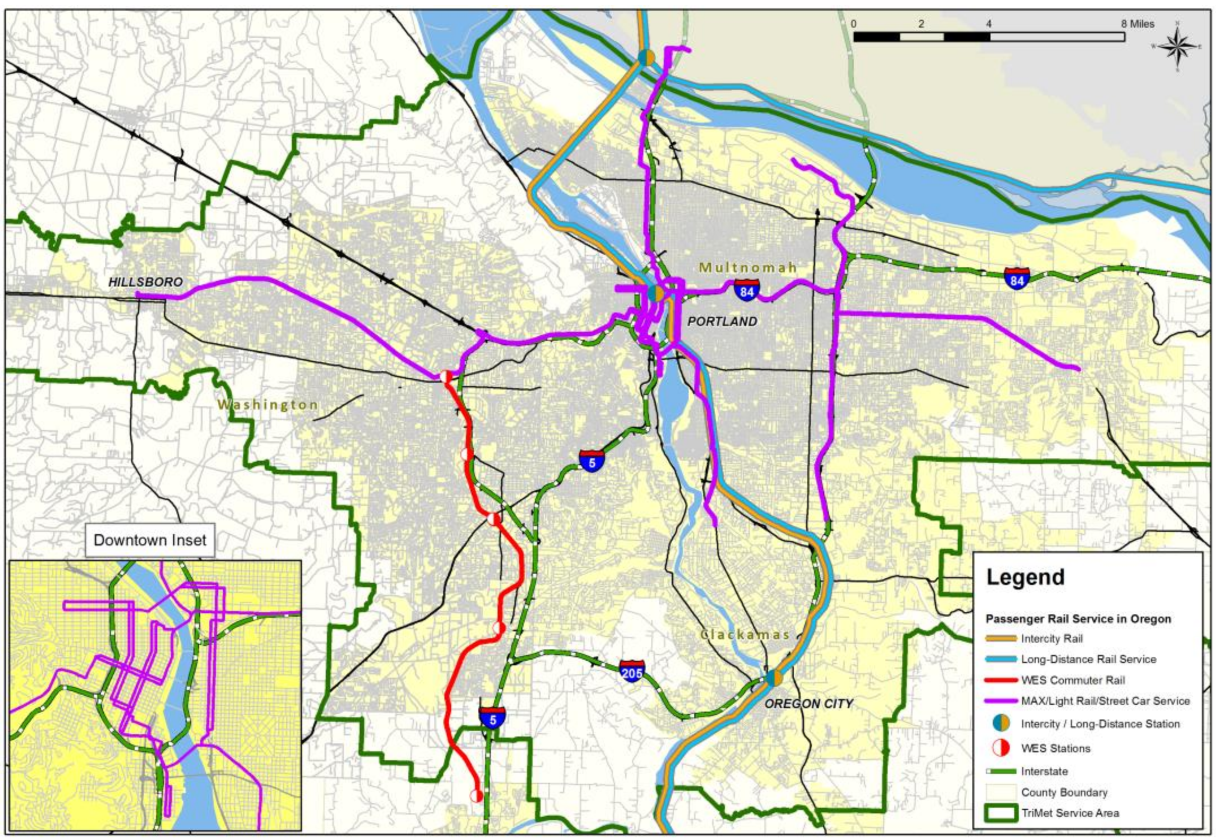
Notes: 1. Based on Fiscal Year reported in TriMet's Annual Performance Report.

2. WES service began in February 2009.

3. Operations Costs

Source: TriMet, Annual Performance Report, FY1999-FY2012.

Figure 3.4 Portland-Area Passenger Rail Service, including Westside Express Service Commuter Rail



Source: Cambridge Systematics and ODOT Rail Division, 2013.

A. Waybill Data Forecasting Methodology

This methodology has been applied to the Surface Transportation Boards Private Carload Waybill Sample. As such, forecasting results have been presented as general statistical information in this report, and commodity movements have not been attributed to any specific railroad in order to preserve their business confidentiality.

The following steps are used to forecast Waybill Sample Data using FAF3.4. The basic premise is to join the growth rates calculated from FAF3.4 (using 2011 and 2035 values) to each record in the Oregon Waybill Sample.

1. Conversion of commodity codes – The Waybill Sample data uses STCC 7-digit codes, while the FAF3.4 uses SCTG 3-digit codes. To make the two datasets compatible, all STCC codes are converted to SCTG codes based on a crosswalk table developed by Cambridge Systematics.
2. Conversion of modes – The second step is to convert train type in the Waybill Sample to match the train types in FAF3.4. One limitation of FAF3.4 is that the only modes associated with rail are rail, and multiple modes & mail, with the latter lumping together intermodal modes with mail. While this is a potential source of inaccuracy, given that mail volume is much less than intermodal container volume, assigning intermodal trains in the Waybill Sample to multiple modes &mail should suffice for our purposes.
3. Conversion of Domestic Origins and Destinations – The next step involves assigning all the Waybill Sample origins and destinations into FAF zones. This is accomplished using a crosswalk developed by Cambridge Systematics that links counties with FAF regions.
4. Conversion of NAFTA Origin and Destinations – In addition to domestic traffic, traffic from/to Mexico and Canada also need to be forecast. To capture these flows, states in Mexico and Canada are aggregated to country-level and assigned FAF codes.
5. Joining the Waybill Sample with FAF3.4 based on Origin, Destination, Commodity and Mode – As all parameters are now consistent, the databases are joined based on the four parameters, and separated for domestic, import and export flows. The majority of records (about 80 percent) are successfully joined this way.
6. Joining of remaining records based on Commodity and Mode – For the remaining 20 percent of records that are not matched, the records are joined base on commodity and mode alone. This means that the growth rates for these flows are taken as the average of all flows contained in the waybill database.

7. Combining all databases – The final step involves combining all of the joined datasets, from steps 5 and 6, calculating the Compound Annual Growth Rate (CAGR), and applying the CAGRs to each record in the Waybill Sample base year. This resulted in a 100 percent match.

B. Train Volumes Estimation Methodology

The train volume estimation methodology is similar in approach to the 2007 Association of American Railroads (AAR) National Rail Freight Infrastructure Capacity and Investment Study[53]. The AAR methodology uses the annual carloads/containers data from the Carload Waybill Sample data and train building assumptions to estimate the daily freight train volumes by origin, destination and transporting railroad, and 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 expansion factors provided in the Carload Waybill Sample data to estimate annual carloads may not be accurate; and (2) the train building assumptions made in the AAR study for estimation of number of daily freight trains from the annual carloads, including cars per train and empty return ratios[54] do not reflect current operations of Class I railroads in Oregon.

Therefore, actual train volumes data, when available, were used to adjust the base year train volume estimates. Also, the latest 2011 Uniform Rail Costing System (URCS) data[55] on empty return ratios for BNSF, UP and other western railroads was used to improve the daily freight train volume estimates. To these estimates, the current weekday daily passenger rail services were added to estimate the total daily train volumes by rail segment.

The methodology described above, was also applied on the annual carloads/containers forecasts (that were developed using the methodology described in Appendix A) to determine the growth in daily freight train volumes by rail segment. For the purpose of creating a future year (2035) total daily train volume map, no forecasting was done for passenger train volumes. Instead, a no-build scenario for passenger rail was considered.

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[53] http://www.camsys.com/pubs/AAR_Nat_%20Rail_Cap_Study.pdf

[54] Empty return ratio is a measure of the amount of car movement that a carload is expected to generate. If a carload is returned back empty to its point of origin, then the ratio takes the value 2.0 (one move forward and one back), while it is not returned at all, then the ratio takes the value of 1.0. The empty return ratio is a value between 1.0 and 2.0, based on the number of returns observed over a period of time, typically annually for a railroad and a car equipment type.

[55] www.stb.dot.gov/stb/industry/urcs.html (last accessed on October 19, 2012)