OREGON DEPARTMENT OF TRANSPORTATION

2010

Oregon Rail Study

The Oregon Department of Transportation Rail Division would like to thank the many contributors to this report. Representatives from railroads, transit districts, shippers, local governments, and state agencies have given hundreds of hours to this work effort. Thank you for your valuable insight and participation.

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Oregon
Theodore R. Kulongoski, Governor

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August 2010

I am pleased to transmit the *Oregon Rail Study* as directed by the 2007 Oregon Legislature. The *Oregon Rail Study* includes an infrastructure assessment of Oregon's shortline railroads, analyses of the state's rail freight industry, an assessment of expanding intercity and commuter passenger rail services, rail industry trends and mitigation strategies, identification of potential funding sources and strategies, return on investment measures, and an examination of the role for state ownership of rail services. The *Oregon Rail Study* is the culmination of multiple studies on the state's existing and future freight and passenger rail systems in Oregon.

Railroads played a major role in the expansion and development of America. As our country moved into the west, towns were built along rail lines to ensure their prosperity and survival. Rail service was so vital that some towns packed up and relocated, sometimes overnight, to be next to the new rail line. Today, railroads continue to be critical partners in economic development and sustainability in Oregon's communities and across the country.

Unlike other transportation systems, the rail network is mostly privately owned and operated. Understanding how it works, how it is used and how decisions are made within the rail industry are key to facilitating its valued service in Oregon. The Oregon Legislature wanted to better understand the opportunities and risks the rail system poses on Oregon's transportation future, and so directed the department to conduct an assessment of the system.

Oregon's vision for a transportation system that supports people, places and the economy as described in the *Oregon Transportation Plan* (2006) is dependent on a robust freight and passenger rail system. Efficient, safe and comprehensive rail service improves livability, reduces congestion, sustains jobs, and contributes to a favorable business climate.

This study will serve as the basis for an updated *Oregon Rail Plan* and contribute to other state, regional and local planning efforts. It identifies opportunities for improving freight and passenger rail conditions to unravel the congestion that threatens Oregon's rail network and, as a result, Oregon's economy and vitality. With this study, policy makers at all levels will have information to identify the rail improvements critical for economic development, to assess the potential benefits, and to make strategic investments for Oregon.

Kelly Taylor

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Rail Division Administrator

Oregon Rail Study

Oregon Department of Transportation
July 2010

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The DVD on the inside back cover contains a copy of this report and supporting technical documents.

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Oregon Department of Transportation

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City of Prineville Railway

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Executive Summary

The 2007 Oregon Legislature asked the Oregon Department of Transportation to conduct a statewide rail study to better understand the rail network in Oregon. Unlike highways and transit systems, railroads are mostly privately owned and operated. Although the rail system is key to Oregon's transportation system, its issues, challenges and opportunities are not widely understood.

This report, the *Oregon Rail Study*, is a summary of 13 individual technical reports commissioned by ODOT over the last two years. The studies are wide-ranging and designed to inform policy makers how the rail system in Oregon is being used, how it might be used in the future, and to provide a foundation for strategic investments in the state's rail system.

The *Oregon Rail Study* includes an infrastructure assessment of Oregon's shortline railroads, analyses of the state's freight rail industry, an assessment of expanding intercity and commuter passenger rail services, rail industry trends and mitigation strategies, identification of potential funding sources and strategies, return on investment measures, and an examination of the role for state ownership of rail services.

Report Methodology & Credits

The *Oregon Rail Study* is a summary, prepared by David Evans and Associates, Inc., of 13 rail-related technical studies, which were prepared by three independent teams led by David Evans and Associates, Inc., Parsons Brinckerhoff, and Shannon and Wilson, Inc.

Challenges

Rail infrastructure supports economic development and provides Oregon with a more sustainable transportation option. All Oregon regions benefit from rail investment through improved freight mobility. The *Oregon Transportation Plan (OTP)* forecasts freight demand to grow by as much as 80 percent between the year 2000 and 2030. Without preservation and strategic growth of our rail system, our highway system will experience increased congestion, which the *OTP* identifies as a major issue facing Oregon's transportation system. A degenerative rail system will negatively impact our ports and cause them to become less competitive in an increasingly challenging global economy.

Travel demand for personal and business trips is projected to grow as population and employment continue to increase. Planning agencies forecast population in Oregon will grow from nearly 3.2 million people in the year 2000 to 4.8 million people in 2030, a 50 percent increase,[1] along with a similar increase in employment. Over one million of these new residents will live in the Willamette Valley and they will generate an increase in travel demand that exceeds the available freight and passenger rail capacity

1 *Forecasts of Oregon's County Population and Components of Change, 2000 to 2040,* Oregon Office of Economic Analysis, 2004.

currently available between Eugene and Portland. This regional growth places a heavy burden on the existing transportation network. Some of the known challenges in 2010 include train delays, the ripple effects on businesses of declining reliability of deliveries, and competition by passenger rail for limited track capacity. Train delay ratios in the Portland area are proportional to conditions seen in the much larger and denser Chicago rail system. Freight trains within the corridor accumulate 100 hours of delay per day at a cost of $300 per hour, or $11 million a year in lost time and efficiency.[2] Without expansion of the capacity of the rail network, future expansion of the Port of Portland will be hindered, shipping costs will increase, reliability will decrease, and shippers may be forced to divert freight away from the region. Passenger rail service frequency between Eugene and Portland cannot grow above current service levels without expanded track capacity. Absent capacity improvements, on-time service performance may fall below the 2009-2010 levels of 68 percent, and the current two hour and 35 minute travel time is expected to increase.

Rail Infrastructure

The Class I railroads operate vast networks across the country and are vital to the national and local economies. Oregon's Class I railroads are BNSF Railway Company (BNSF) and Union Pacific Railroad (UPRR). Both railroads are financially sound and invest billions each year in improving their nation-wide infrastructure. Their future is constrained by congestion due to lack of capacity on their lines, but the track they have is well maintained.

Shortline carriers play an important role in connecting smaller communities and shippers to the national rail system. In contrast to the Class I railroads, Oregon's shortlines have available capacity, but the capital intensive nature of the business combined with the low business volumes have left some shortlines on the brink of closure. The existing conditions of shortline track, bridges, and tunnels are generally in need of improvement and were assessed in detail in this study.

Freight Rail Service

As Oregon faces increasing population growth and freight demand over the next 20 years, robust rail service will be essential to providing efficient and fluid mobility for freight and passenger travel alike. However, unlike the State of Oregon's role in highway system planning, the state's role in planning and influencing the rail system is limited because the vast majority of railroads in Oregon are privately owned and federally regulated. Many forces affect Oregon's rail service: federal regulations, national and regional economic conditions, as well as the markets and operations of the railroads themselves. The state is not in a position to influence all aspects of the rail industry, but there is an opportunity to understand the business strategies of the railroads, the impacts of these strategies in Oregon, and to position Oregon for the ensuing challenges and opportunities.

2 *I-5 Rail Capacity Study*, HDR Inc., February 2003.

In the national context, Oregon is not a major player in terms of track mileage or traffic volume. In 2007, Oregon ranked 39th among states for rail tonnage carried; this includes originating, terminating and through traffic. At a national level, the Class I railroads are focused on maintaining network fluidity for their busiest corridors, which predominantly handle coal, chemicals, intermodal,[3] and grain movements. Understanding the Class I business model, and how Oregon fits in it, is the first step in determining how Oregon can affect the rail industry in the state.

Class I railroads have increasingly favored movement of large volume, unit train[4] shipments as a means of obtaining maximum tonnage and revenue on their capacity-constrained networks. Although the Class I carriers are required by law to provide service to all traffic, sometimes the smaller shipments may be unprofitable or even costly to the Class I railroads. For this reason, some Oregon shippers cannot obtain competitive pricing and service.

Shortline carriers play an important role in connecting smaller shippers to the national rail system. In contrast to the Class I railroads, Oregon's shortlines have available capacity, but they are challenged by low volumes and contractual restrictions or "paper barriers" that limit their access to one major railroad.

Several strategies may be considered by policy makers to plan and partner with railroads to preserve and expand rail access in Oregon. Many of the strategies are targeted at creating incentives for the major railroad to continue serving Oregon shippers. These include increasing railroad capacity, developing hub facilities for transloading and aggregating shipments, and purchasing rail cars for Oregon-specific uses. Freight growth projections demonstrate an opportunity to increase rail service in the I-5 corridor. However, the capacity to handle this intra-Oregon traffic exists mainly on the shortlines. In order to serve this market, these shortlines need infrastructure improvements, access to multimodal hubbing facilities, and access agreements with their Class I partners.

Intercity Passenger Rail Service

As population, employment and freight demand are all projected to increase, regional and state transportation plans include some limited capacity improvements, but there are no plans to build capacity into the highway and rail systems to match this projected growth. Accommodating this rising demand for passenger and freight service, especially in the Willamette Valley, presents a major challenge for the rail industry and transportation planners alike.

To continue Oregon's efforts to grow passenger rail service, ODOT commissioned a study of existing rail lines between Portland and Ashland.

3 Intermodal is a term used to describe transporting freight in containers or truck trailers, using multiple modes of transportation (rail, ship, and truck), without any handling of the freight itself when changing modes.
4 A unit train is loaded at a single origin and unloaded at a single destination and are typically 8,000 feet long and made up of 100 or more cars.

PORTLAND TO EUGENE

The *Oregon Rail Study* assesses the two existing rail lines between Portland and Eugene for providing improved future intercity passenger service. Without capacity improvements, by 2030 travel times for the existing Portland to Eugene intercity service could lengthen to over three hours each way. With improvements and increased frequency of service, intercity passenger rail ridership could more than double by 2030. However without improvements, ridership will only increase by 49 percent.

Oregon is part of a federally designated high-speed rail corridor, the Pacific Northwest Rail Corridor (PNWRC), between Eugene and Vancouver, BC. This designation was granted in 1994 based on projected ridership, public benefits, and anticipated partnership participation of faster and safer intercity passenger rail in the future.

Today passengers traveling between Portland and Eugene have six daily roundtrip options: two Amtrak *Cascades* trains and three intercity *Thruway* buses, all sponsored by ODOT, and the Amtrak *Coast Starlight*. The two Amtrak *Cascades* trains run from Eugene to Portland in the morning and on to Seattle and Vancouver, BC. Both *Cascades* trains from Portland to Eugene run in the afternoon/evening. The buses run at other times to provide a link to Amtrak train service at Portland's Union Station. The trains run on the UPRR mainline track, which carries many more freight trains on the same route (see Chapter 4). The scheduled travel time each way between Portland and Eugene is two hours and 35 minutes. On-time performance averaged 68 percent in 2009-2010. Significant investment is required to increase passenger service from two to six roundtrips per day, increase average speed from 42 to 65 mph, and improve reliability from 68 percent to 95 percent on-time performance.

The two existing rail alignments studied include the current line used, UPRR, and Portland & Western Railroad's (PNWR) Oregon Electric (OE) line. The OE alternative would attract more riders, be less expensive to construct (approximately $1.8 billion verses over $2 billion on the UPRR), and improve PNWR freight service without risking on-time performance of the passenger trains due to high density freight congestion, which exists on the UPRR line. The OE alternative would also improve freight service on the high-density UPRR line by returning its capacity used for the current passenger service to increased freight service.

At the national level, the federal government has recently awarded funds for investment in the federally designated high-speed rail corridor between Eugene and Vancouver, BC from the High-Speed Intercity Passenger Rail (HSIPR) program. This newly created program is the first federal on-going passenger rail program in the United States (US). The next phase to implement higher-speed passenger service in the Willamette Valley is to prepare an assessment in accordance with the National Environmental Policy Act, which will include an Alternatives Analysis to review other potential routes and identify Oregon's preferred passenger service route. Engineering and environmental studies, along with a public involvement process, will be necessary to support the Alternatives Analysis. These efforts are a prerequisite to federal funding for major corridor improvements.

EUGENE TO ASHLAND

The *Oregon Rail Study* assesses extending intercity passenger rail service from Eugene to Ashland on the existing freight line, the Central Oregon & Pacific Railroad (CORP) Siskiyou line. The estimated cost of improvements on the existing rail line exceeds $2.9 billion, while attracting less than 2,700 passengers per year. Travel time on an improved, existing alignment between Ashland and Eugene is estimated to be just over five hours, which is significantly longer than three hours by automobile, or four hours by bus, and is the primary deterrent to potential passenger rail riders. A new, faster alignment more competitive with the three-hour auto travel time would increase ridership by 50 percent over the five-hour scenario. However, to achieve the three-hour run time would require significantly more than the $2.9 billion in capital investment to straighten the alignment through rolling and mountainous terrain. Many challenges facing implementation of intercity passenger rail between Eugene and Ashland render initiating passenger service infeasible at this time.

Commuter Rail Service

Like intercity passenger rail, commuter rail typically operates over the privately owned freight rail system. It is distinguished from intercity passenger rail by connecting cities within the same metropolitan area during commuting hours. Another difference is when Congress created Amtrak in 1970, it mandated that the freight system must allow Amtrak to operate intercity passenger service on the system, but exempted commuter rail. Therefore, the railroads do not have to accommodate commuter rail service on their lines.

Since 1997, six studies have examined the idea of adding commuter rail service to the following four Oregon corridors:

- Ashland to Medford, 2001
- Yamhill County to Portland, 1998 and 2008
- Wilsonville to Beaverton, 1997
- Vancouver, Washington (WA) to Portland, 1999 and 2006

Five aspects of commuter rail should be evaluated in any feasibility analysis in order to obtain a complete picture of the opportunities and constraints. The five critical aspects are: outreach to the railroad owners of the track regarding right-of-way and trackage rights, data collection, operating plan assumptions, data analysis, and feasibility assessment.

The *Oregon Rail Study* includes an assessment of extending the existing commuter rail service between Beaverton and Wilsonville to Salem. The assessment revealed that extending commuter rail to Salem is technically feasible, but it faces political and financial challenges, such as lack of support from the host-railroad, PNWR, and lack of identified funding. Ridership is estimated at 3,000 to 4,000 per day. Capital costs are estimated at $327-387 million and operation costs are estimated at $5.5-6.9 million per year.

Albany & Eastern Railroad bridge upgrade, a *Connect*Oregon II project

As population and road congestion are projected to grow, state and local leaders are interested in commuter rail as a piece of the transportation solution. Future studies could focus on the recommended study aspects in varying degrees of depth. Though not every study may cover all aspects due to cost or time constraints, railroad outreach should always be considered. Without the cooperation of the railroad, commuter projects on existing freight rail lines are not possible.

Land Use Impacts

Many Oregon communities were settled along the state's rail lines, most of which remain in operation today. Demand for freight and passenger rail is projected to increase, which means more trains will be operating throughout Oregon. The increase in the frequency of trains will present benefits and challenges for rail carriers and the communities along the rail corridors. Careful community planning must be undertaken to avoid creating new conflicts or exacerbating existing conflicts between heavy rail and neighborhoods. The common conflicts between rail and adjacent land uses can be grouped under three issue areas: the impacts of increased train frequency on communities, the ability of shippers to gain access to rail service, and the impacts of community development on freight railroads.

Land use decisions have impacts on freight rail operations and, by extension, the industries served by freight rail. Local jurisdictions nor individual businesses can afford to leave rail carriers out of their calculations regarding development along rail lines. Early involvement of the freight railroads is essential when planning or proposing new uses or development adjacent to a rail line. Whether a city is updating its comprehensive plan, a property owner is seeking rail service, or a passenger station is being considered, involving the rail operator early in the process will increase the likelihood for success for all parties in the short and long terms.

State Ownership

As states recognize the importance of maintaining freight and passenger rail in the transportation system, some have decided to own rail assets. The benefits of state rail ownership are significant and can support the preservation of a key part of Oregon's transportation infrastructure and the businesses and communities that depend on it. State ownership also carries risks. States such as Oklahoma, Wisconsin, Washington and New Mexico have taken on ownership of rail infrastructure with varying degrees of success. These case studies are examined in the *Oregon Rail Study*.

As the rail industry continues to change in Oregon, especially for the shortlines, the state can expect to be faced with more decisions about whether or not to purchase or operate rail lines. Currently Oregon owns 155 miles of rail right-of-way, the Salem passenger rail station, and has assisted other public entities in purchasing rail lines.

However, in preparing for future opportunities that will arise, Oregon can look to other states that own and operate rail lines to inform its future decisions. States that have committed resources to support long term freight rail programs have been the most successful, seeing fruitful operations and growing volumes over time. Other states that own lines without a well-supported program continue to struggle. Purchasing a low-business freight line to convert to a passenger operation, like in New Mexico, requires a strong coalition of public partners from the beginning, because of the higher maintenance and operations costs, and community impacts of increased trains. Lessons from these states can provide insight as Oregon addresses future ownership decisions.

Funding Options and Return on Investment

Oregon has long recognized that communities depend on having multiple transportation options to reduce congestion and support economic development. Robust freight and passenger rail service is part of the solution. However, state funding for this program is limited. Unlike many other states, a permanent funding source for rail infrastructure does not exist in Oregon. Current rail funding is limited to the sale of custom vehicle license plates, which yields about $4 million per year dedicated to passenger rail programs. This funding, coupled with ticket revenue, does not provide enough to pay for planning, equipment, capacity enhancements, or maintenance. Options used to fund freight and passenger rail programs in other states are presented in the *Oregon Rail Study*.

The Way Forward

The *Oregon Rail Study* provides a foundation by assessing the benefits and costs of enhancing the rail system and what the future role of Oregon could be in maintaining and growing that system, including:

- An inventory of existing shortline infrastructure conditions including costs to replace, repair, or upgrade the infrastructure to make shipping by rail more competitive;
- An updated Oregon commodity flow analysis identifying the corridors with the most freight rail growth potential;
- Strategies for improving freight rail growth in Oregon;
- An inventory of freight rail lines considered "at-risk" of abandonment;
- Three feasibility studies for two potential intercity services (Portland to Eugene and Eugene to Ashland) and one commuter service (Wilsonville to Salem);
- A review of past commuter rail studies and issues to consider when evaluating future commuter rail service;
- An analysis of land use impacts on freight rail service;

- A review of different state ownership models to assist the state in optimizing its role in supporting the rail system, while avoiding some of the pitfalls experienced in the past and by other states; and
- An analysis of state funding options and estimated potential returns on investment.

This information will be used to update the *Oregon Rail Plan*, a federally-required statewide freight and passenger rail strategy, contribute to other state, regional and local planning efforts, and inform policy makers on potential strategic rail investments for Oregon.

Acronyms

286K	286,000 pounds
AA/DEIS	Alternatives Analysis/Draft Environmental Impact Statement
AAR	Association of American Railroads
AERC	Albany & Eastern Railroad Company
ARRA	American Recovery and Reinvestment Act of 2009
BC	British Columbia
BN	Burlington Northern
BNSF	BNSF Railway Company
CA	California
CAT	Canby Area Transit
CBRL	Coos Bay Rail Link
CFF	Commodity Flow Forecast
CN	Canadian National Rail Service
CO2	Carbon Dioxide
COACT	Central Oregon Area Commission on Transportation
COP	City of Prineville Railway
CORP	Central Oregon & Pacific Railroad
CP	Canadian Pacific Railway
CREATE	Chicago Region Environmental and Transportation Efficiency Program
CWR	Continuous Welded Rail
DMU	Diesel Multiple Unit
DMV	Driver and Motor Vehicles Services Division
DOT	Department of Transportation
FAST	Freight Action Strategy for Seattle-Tacoma
FEMA	Federal Emergency Management Agency
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GRIP	Governor Richardson's Investment Program
HLSC	Hampton Railway
HSIPR	High-Speed Intercity Passenger Rail
I-5	Interstate 5
I-84	Interstate 84
ICC	Interstate Commerce Commission
IFA	Infrastructure Finance Authority
INPR	Idaho Northern & Pacific Railroad
KCS	Kansas City Southern Railway Company
KNOR	Klamath Northern Railway
kWh	Kilowatt-hour
LPN	Longview Portland & Northern Railway
LRY	Lake Railway
MH	Mount Hood Railroad
mph	Miles Per Hour
MRCOG	Mid-Region Council of Governments
MW	Megawatt
NS	Norfolk Southern Corporation
O&C	Oregon & California Railroad
ODOT	Oregon Department of Transportation
OE	Oregon Electric
OPR	Oregon Pacific Railroad
OR	Oregon
OTP	Oregon Transportation Plan
PCC	Palouse River & Coulee City Railroad
PNWR	Portland & Western Railroad
PNWRC	Pacific Northwest Rail Corridor
POTB	Port of Tillamook Bay Railroad
PRIIA	Passenger Rail Investment and Improvement Act
PT	Peninsula Terminal Company
PTRC	Portland Terminal Railroad
RSIA	Rail Safety Improvement Act
SCWS	SMART Central at Wilsonville Station
SKATS	Salem-Keizer Area Transportation Study
SMART	South Metro Area Regional Transit
SP	Southern Pacific Railroad
SP&S	Spokane, Portland & Seattle Railroad
SRF	Strategic Reserve Fund
STB	Surface Transportation Board
TOD	Transit-Oriented Development
TRB	Transportation Research Board
TriMet	Tri-County Metropolitan Transportation District of Oregon
TSP	Transportation System Plan
UGB	Urban Growth Boundary
UPRR	Union Pacific Railroad
US	United States
WA	Washington
WCTR	WCTU Railway Company
WES	Westside Express Service
WPRR	Willamette & Pacific Railroad
WSK	Wilsonville to Salem Commuter Rail Study
WURR	Wallowa Union Railroad
WVR	Willamette Valley Railway
WYCO	Wyoming & Colorado Railroad

CHAPTER 1

Introduction and Purpose

Introduction

The *Oregon Rail Study* presents the results of 13 rail-related studies conducted between 2008 and 2010. The studies are wide-ranging and were designed to inventory current rail infrastructure and services, how they are used, how they might be used in the future, and to provide a basis for Oregon to make strategic investments.

Oregon's transportation infrastructure consists of over 66,000 miles of roads, 7,000 bridges, 97 airports, 2,400 miles of railroad tracks, and 23 ports. Increasing congestion in the system from planned growth and aging infrastructure causes delays, and delays impose costs on businesses, in turn affecting business retention, jobs, and ultimately the state economy. Compounding the effects of congestion was a sense that investment in maintaining some of Oregon's non-highway infrastructure was lagging due to limited non-highway transportation funding. In 2005, the Oregon Legislature responded to those concerns by creating a program funded by lottery bonds to make key investments in non-highway multimodal infrastructure, which became known as *Connect*Oregon. In 2007, the legislature called for a multimodal study to examine the existing condition and function of, and future plans for, air, rail, and marine infrastructure. The *Oregon Rail Study* is one part of the multimodal study.

The *Oregon Rail Study* includes an infrastructure assessment of Oregon's shortline railroads, analyses of the state's freight rail industry, the feasibility of intercity and commuter passenger rail service, business trends and mitigation strategies, identification of potential funding sources and strategies, and return on investment measures. With the *Oregon Rail Study* complete, the Oregon Department of Transportation (ODOT) will begin to update the 2001 *Oregon Rail Plan* using the data and research collected and analyzed in the study.

The technical subject detail is included in Appendices A through M of this report.

What Are the Challenges?

Over the next 20 years, Oregon's population is expected to grow by more than 50 percent, approaching 4.8 million. During the same period, freight traffic is expected to grow by 80 percent. This regional growth places a heavy burden on the existing transportation network. Some of the known challenges in 2010 include train delays, the ripple effects on businesses of declining reliability of deliveries, and competition by passenger rail for limited track capacity. Train delay ratios in the Portland area are proportional to conditions seen in the much larger and denser Chicago rail system. Freight trains within the corridor accumulate 100 hours of delay per day at a cost of $300 per hour, or $11 million a year in lost time and efficiency.[5] Without expansion of the capacity of the rail network, future expansion of the Port of Portland will be hindered, shipping costs will increase, reliability will decrease, and shippers may be forced to divert freight away from the region. Passenger rail service frequency between Eugene and Portland cannot grow above current service levels without expanded track capacity. Absent capacity improvements, on-time performance may fall below the 2009-2010 levels of 68 percent, and the current two hour and 35 minute travel time will increase.

5 *I-5 Rail Capacity Study*, HDR Inc., February 2003.

Purpose of the Oregon Rail Study Report

On the most basic level, the *Oregon Rail Study* provides up-to-date information to Oregon's rail planners and decision-makers. The *Oregon Rail Plan* has not been updated since 2001, and the economic landscape has changed considerably since then. The *Oregon Rail Plan* is an element of the *OTP*, the state's long-range multimodal transportation plan and overarching policy document. The *OTP* calls for preserving and growing rail capacity and services, including preserving existing rail infrastructure, where freight services are economically viable, as well as passenger service through the state. Within that state planning context, the study fulfills another important, perhaps lesser-known purpose: to close a gap in Oregon's knowledge about its existing rail system and its potential to grow and provide solutions to transportation challenges.

Far more public data is available for highways than for railroads, which are no less critical to the efficient flow of goods. Analysis of freight transportation planning in general, and railroad transportation planning in particular, is hindered by a lack of publicly available, detailed, and accurate data. Commodity and demand forecasting data that have been available prior to the 2009 *Commodity Flow Forecast* by ODOT (see E) have been based on proprietary information, much of which uses data assumptions and methods which are also not publicly available. Better, publicly available data allows for better rail policies and investment decisions.

Compared to other modes, the rail sector has unique characteristics. Nearly all of the infrastructure and services are privately owned and operated. Infrastructure for the trucking industry—roads, highways, and bridges—is provided by federal and state departments of transportation, and in Oregon is funded by a gas tax on light vehicles and a weight-mile tax for heavy trucks. Marine and air terminals are provided by semi-public agencies. The rail industry, in contrast, builds, maintains, and operates its capital-intensive infrastructure and equipment largely unaided by direct public investment.

The role of the public sector in the rail industry in recent years has been focused at the transportation planning level for intercity passenger rail and as a regulator. However, the freight system and services are defined in the *OTP* as a state function, and the state is responsible for promoting rail freight and passenger service for the movement of goods and passengers. Yet, because of the private nature of the industry, many of the smaller railroad companies operate somewhat "under the radar" compared to other transportation modes. While they provide vital connections between suppliers and manufacturers, relatively little is known about them, their operating environments, and the condition of their infrastructure. The *Oregon Rail Study* was designed to close that data gap.

Another key function of the study was to examine opportunities to augment passenger rail, both intercity and commuter rail. At the national level, the federal government has recently awarded funds from the HSIPR program for investment in the federally designated high-speed rail corridor between Eugene and Vancouver, BC. This newly created program is the first federal on-going passenger rail program in the US.

Oregon Rail Study Supporting Technical Documents

The *Oregon Rail Study* is a summary of rail-related studies. All of the work builds upon previous Oregon rail planning studies (discussed in the next section).

These studies are available on the DVD attached to the back cover of this report or at http://www.oregon.gov/ODOT/RAIL/Forms_Publications.shtml#Publications. The appendix titles, authors, and dates of publication are as follows:

A. *Oregon Freight Rail System* (Parsons Brinckerhoff, Simpson Consulting, Tangent Services Inc., April 2010)

B. *Oregon Rail Bridge Assessments, Report of Study Findings* (David Evans and Associates, Inc., December 21, 2009)

C. *Oregon Rail Tunnel Assessment: Double-Stack Clearance Inventory for Oregon Department of Transportation Rail Division* (Shannon & Wilson, Inc., February 3, 2009)

D. *Oregon Rail Economic Trends* (Parsons Brinckerhoff and Tangent Services, Inc., December 2009)

E. *Oregon Commodity Flow Forecast* (Parsons Brinckerhoff, October 2009)

F. *Portland to Eugene Intercity Passenger Rail Assessment* (Parsons Brinckerhoff, June 2010)

G. *Eugene to Ashland Intercity Passenger Rail Assessment* (Parsons Brinckerhoff, Pacific Rail Solutions, Tangent Services, Inc., Wilbur Smith and Associates, April 2010)

H. *Summary of Commuter Rail Studies Completed in Oregon Since 1997* (Parsons Brinckerhoff, December 2008)

I. *Wilsonville to Salem Commuter Rail Assessment* (Parsons Brinckerhoff, Simpson Consulting, Sorin Garber Consulting Group, Tangent Services, and Wilbur Smith and Associates, April 2010)

J. *State Ownership of Rail Assets* (Parsons Brinckerhoff, Simpson Consulting, Tangent Services, Inc., February 2010)

K. *Rail Access & Land Use Considerations* (Parsons Brinckerhoff, Sorin Garber Consulting Group, Tangent Services, Inc., December 2009)

L. *Rail Industry Return on Investment Calculations* (Parsons Brinckerhoff, March 2009)

M. *Rail Funding Options* (Parsons Brinckerhoff, October 2008)

Previous Oregon Rail Studies

- *I-5 Rail Capacity Study*, HDR Inc., 2003
- *Oregon Rail Plan*, ODOT, 2001
- *PNWRC Oregon Segment Preliminary Environmental Analysis*, ODOT, 2000
- *Oregon High Speed Rail Business Plan*, ODOT, 1994
- *Oregon High Speed Rail Capacity Analysis*, Wilbur Smith Associates, 1994
- *Oregon Passenger Policy and Plan*, ODOT, 1992
- *Oregon Rail Plan*, ODOT, 1986
- *Oregon Rail Plan*, ODOT, 1978
- *Willamette Valley Passenger Rail Study*, ODOT, 1977

CHAPTER 2

Background

To form successful policies related to the railroad industry within the state, Oregon must understand the national and state context of the railroad industry, its history, operations, markets, and external challenges. Both national and state railroads are subject to the intricacies of a national and multimodal transportation network. How Oregon's rail network fits into that broader picture is the focus of this chapter.

The National Rail Network

America's rail system began in the early 1830s, and by 1869 the transcontinental railway was completed. For several decades, and at the end of the 19th century, railroads were the nation's largest industry, and the rail industry included within it some of the wealthiest and largest privately held businesses in the country. Railroads had a near-monopoly on surface transportation throughout much of the country. By the late 1920s, railroads carried 70 percent of intercity travelers and 75 percent of intercity freight tonnage. Only about 17 percent of freight traveled by water on canals, rivers and lakes.

The physical extent of the US rail network peaked in 1916 when 254,000 miles of railroad were owned and operated by all railroads. Since that time, according to data provided by the Association of American Railroads (AAR), the total miles of railroad in the US has fallen by 45 percent to 139,887 in 2008.

The volume of passenger rail travel between cities was greatest during World War II as a result of fuel rationing and travel by military personnel. After the war, the expanding road network and more affordable automobiles initiated a long period of decline in passenger rail ridership. Passenger trains, once considered an essential source of revenue for railroads, had become an economic burden by the 1960s. The National Rail Passenger Service Act of 1970 allowed railroads to stop providing passenger service and mandated the formation of Amtrak to operate intercity passenger service with federal assistance. In return, participating railroads were required to give Amtrak their passenger equipment and perpetual rights of access to the freight rail networks. Amtrak routes around the country are, in general, a legacy of the final privately operated passenger corridors that were in service when Amtrak started in 1971.

The construction of the Interstate Highway System, beginning in 1956, affected the freight rail industry too, altering the competitive environment dramatically. While the competitive environment was changing, rail transportation continued to operate under regulations developed when rail transport had a monopoly on intercity traffic and railroads chiefly competed against each other. The Interstate Commerce Commission heavily regulated the railroad industry, which was unable to change the rates it charged shippers and passengers. Reducing costs was the only way to become more profitable but, at the same time, government regulation and agreements with labor unions tightly restricted what cost-cutting could take place. In short, the regulatory regime tended to stymie change and flexibility. By the late 1960s, it was widely recognized that stringent federal regulation of railroads had hampered their ability to respond to the new market environment; by 1970, over 25 percent of America's rail system was under the control of bankruptcy trustees. Rail-dependent heavy industry faced failing, but necessary, rail service.

Penn Central Railroad's declaration of bankruptcy in 1970 triggered an overhaul of the regulatory structure. Penn Central's dominance of rail service in the Northeast, coupled with its badly deteriorated financial and physical condition, meant its loss threatened passenger and freight service over a large portion of the country. Over the next decade, Congress responded with a series of actions and funding initiatives to preserve freight rail service in the Northeast and ultimately to restore its ability to be self-supporting. The Staggers Rail Act of 1980 deregulated many commercial aspects of the freight rail industry, restricting the Interstate Commerce Commission's oversight of fees and rail routes where there was market competition. Although the crisis originated in the Northeast, the resulting legislation changed the railroad industry nationwide.

One significant change was allowing railroads to set individually contracted rates. This turned out to be the key to the industry's revitalization and the spark that ignited the merger movement. The industry seized the opportunity to ensure market share through merger. The more than 40 Class I companies that had existed eventually merged into an industry structure of seven very large railroad companies, a relatively small collection of regional railroads, and many shortline carriers. The latter were created as the large trunk line carriers shed their less profitable lines. There are now upward of 600 shortline carriers with varying degrees of participation in the national rail system.

In 2009, only seven Class I railroads operated about 96,000 route miles in the US and earned approximately 92 percent of all freight railroad revenue. Four railroads dominate the industry: BNSF Railway Company (BNSF) and Union Pacific Railroad (UPRR) in the West and Midwest, and CSX Corporation and Norfolk Southern Corporation in the East. Together they share about 90 percent of total US rail traffic and revenue. Kansas City Southern Railway Company (KCS) and two Canadian companies, Canadian National Rail Service and Canadian Pacific Railway, are the other, smaller Class I railway companies operating in the US. BNSF and UPRR are the only Class I railroads operating in Oregon.

The merger movement in the 1980s and 1990s also changed the physical flow of goods over the total rail network. The merger carriers emphasized high-density lines by channeling freight onto their most efficient corridors at the cost of other previously competitive lines. In some cases, duplicative track lines were abandoned or sold, which has reduced alternative routes in some areas of the country and with it, the ability of shippers in those areas to obtain competitive rates.

Rail Network in Oregon

The history of 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 carry forest products. The original north-south interstate rail line through the Willamette Valley and into California was built by a succession of entrepreneurs and business rivals between 1868 and 1887. In 1870, the Oregon and California Railroad (O&C) was incorporated with the aim of completing a route from Portland to a connection with Southern Pacific Railroad (SP) track in northern California. Construction of the mainline, from Portland to California, began in the 1870s. The route reached Eugene by October 1871 and Roseburg by the close of the following year but did not reach Ashland until 1884. At the end of 1884, O&C stockholders voted to sell the railroad to SP, although the transfer was not finalized until 1927.

In December 1887, SP completed the Siskiyou Route over the Siskiyou Range, which became the first direct rail link between California and the Pacific Northwest. The Siskiyou Route was the sole rail line linking California to Oregon until September 1926 when SP completed an alternative route between Black Butte, CA and Eugene, OR 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. After opening of the new line, the Siskiyou Route continued to be important to SP for originating lucrative forest products shipments.

Between 1887 and 1994, SP continued to operate freight service over the Siskiyou line. On the last day of 1994, SP sold 219 miles of the Siskiyou line between Springfield Junction and Belleview (just south of Ashland) to the newly formed Central Oregon & Pacific Railroad (CORP), a subsidiary of RailTex. CORP leased the remaining 79 miles of the Siskiyou line from Belleview to Black Butte, CA. In 2002, RailTex was merged into RailAmerica, making CORP a wholly owned subsidiary of RailAmerica. True to its historic origins, the railroad's principal cargo still consists of wood products, though in quantities much diminished from its heyday in the last century. A major part of the rail traffic is exchanged with UPRR at Eugene, although CORP has developed some intrastate hauls jointly with Portland & Western Railroad (PNWR).

Passenger rail service was initiated in 1887 as the *Oregon Express* (northbound) and *California Express* (southbound). In 1901, SP began promoting the line as the *Shasta Express* (later the *Shasta Limited*).[6] After SP built and opened the alternative route in 1926 through Klamath Falls, most through passenger service switched to the new line.

Passenger operations were a major driver for construction of most rail lines in the late 1800s; the O&C/SP lines in Oregon were no exception. Long-distance trains continued to operate over the Oregon City to Salem to Eugene route to and from California. In the heyday of intercity passenger services, five passenger trains traveled the Portland to Eugene alignment each day: three to the Bay Area, one to Los Angeles, and a single Portland to Ashland roundtrip. Service by 1971 had declined to a thrice-weekly service between Oakland and Portland. Under Amtrak, this train evolved to become the daily Los Angeles to Seattle *Coast Starlight*. Except for a state-supported experiment in 1980-81 when Amtrak operated two roundtrip *Willamette Valley Express* passenger trains between Eugene and Portland, the *Coast Starlight* remained as the only passenger rail service in the valley until Oregon began support of the *Cascades* service in 1994.

Oregon is fortunate to have two active rail alignments serving the major population centers in the Willamette Valley. Each alignment was engineered for passenger rail service. The original companies, now merged into UPRR and BNSF,[7] competed vigorously for passengers in the early 1900s between Portland, Salem, and Eugene. The Oregon Electric (OE) line was first developed as an independent passenger-oriented operation and at its zenith it was the largest electrified railroad operation in Oregon. The OE line transitioned to a freight emphasis and later was absorbed into the Spokane, Portland and Seattle (SP&S) Railroad in 1910, one of the Hill-affiliated rail companies that later formed the Burlington Northern Railroad. Passenger service on the OE line ended in 1933. SP, the predecessor to UPRR, was still operating trains three times a week from Oakland, CA to Portland, OR over the present *Coast Starlight* route at the time of the 1971 Amtrak assumption of passenger service.

Like the rest of the country, Oregon has experienced a paring back of its rail network over the past 40 years, losing 24 percent, or 765, of its route miles. The merger of the Great Northern, Northern Pacific, and SP&S lines into Burlington Northern (BN) in 1970 created a measure of financial stability for those lines for the next 20 years. BN later merged with Atchison Topeka & Santa Fe Railway to become BNSF in 1995. Spinoffs, when they did occur, often included preservation of service through partnerships with shortline operators with lower operating costs and more flexible workforces. SP was under substantial financial duress during this same period, undertaking a number of abandonments, but these actions did not threaten large areas of Oregon with loss of rail service. However, in 1986, the State of Oregon intervened with financial support for Lake County to purchase the 55.4-mile Alturas, CA to Lakeview, OR branch rail line. Four years later, Oregon supported a purchase by the Port of Tillamook Bay Railroad (POTB) of 86 miles of railroad in Washington and Tillamook counties. In 2003, Oregon assisted Wallowa and Union counties in the purchase of 63 miles from Elgin to Joseph now called the Wallowa Union Railroad (WURR). In 2009, the Coos Bay Rail Link (CBRL) was purchased by the Oregon International Port of Coos Bay with state assistance. These are Oregon's newest publicly owned shortlines of the modern era.

6 *Southern Pacific Railroad*, Brian Solomon, 1999.

7 Formerly, the Burlington Northern and Santa Fe Railway Company.

Oregon's railroads include:

- Albany & Eastern Railroad Company (AERC)
- BNSF Railway Company (BNSF)
- Central Oregon & Pacific Railroad (CORP)
- City of Prineville Railway (COP)
- Coos Bay Rail Link (CBRL)
- Hampton Railway (HLSC)
- Idaho Northern & Pacific Railroad (INPR)
- Klamath Northern Railway (KNOR)
- Lake Railway (LRY)
- Longview Portland & Northern Railway (LPN)
- Mount Hood Railroad (MH)
- Oregon Pacific Railroad (OPR)
- Palouse River & Coulee City Railroad (PCC)
- Peninsula Terminal Company (PT)
- Port of Tillamook Bay Railroad (POTB)
- Portland Terminal Railroad (PTRC)
- Portland & Western Railroad (PNWR)
- Union Pacific Railroad (UPRR)
- WCTU Railway Company (WCTR)
- Wallowa Union Railroad (WURR)
- Willamette & Pacific Railroad (WPRR)
- Willamette Valley Railway (WVR)
- Wyoming & Colorado Railroad (WYCO)

Railroad Classification

The Surface Transportation Board (STB) (see next section on regulation) classifies freight railroads by their gross operating revenues. **Class I railroads** are those with annual gross revenues exceeding $401.4 million. Two Class I railroads operate in Oregon, UPRR and BNSF.

Class II or Regional railroads operate at least 350 miles and have annual revenue exceeding $40 million. Regional railroads operate approximately 15,000 route miles nationally and earn about 3.5 percent of all freight railroad revenue. In Oregon, PNWR and WPRR operate as a single regional carrier, even though they are officially two separate shortline railroads.

Class III or Shortline railroads are those that generate revenue of less than $40 million annually. Shortline railroads operate approximately 26,000 route miles in the US and earn about four percent of all freight railroad revenue. There are currently 21 shortline operations in Oregon (including PTRC, a switching operation owned by both Class I railroads).

PNWR on the BNSF Bridge over the Oregon Slough © Robert Reynolds/Genesee & Wyoming Inc.

Regulation of Railroads

While freight carriers operate locally, they adhere to federal regulations, creating an operating environment that can be difficult for local agencies and developers along rail corridors to understand. An understanding of the broad national context within which freight carriers operate can facilitate local, regional, and state efforts to leverage advantages of the rail mode at the local level. It can also spur collaboration to address operational, environmental, and safety issues that impact both localities and railroads.

Railroads in the US operate in a legal and regulatory environment that is distinct from most other private business enterprises. Railways have the powers of "eminent domain" to acquire right-of-way and extend their operations, an unusual grant of power by states to a private sector business. Necessary supporting facilities are also exempt from local zoning and permitting unless public funding is involved.

The Railway Labor Act governs labor relations in the rail industry. The act protects workers' rights to organize and requires the carriers to negotiate with their employees and resolve disputes to ensure that rail service is not disrupted by labor disputes. Unresolved issues can trigger federal intervention by transferring the dispute to the National Railroad Adjustment Board.

Two federal agencies share responsibilities for federal oversight of the nation's rail system: the STB and the Federal Railroad Administration (FRA).

Surface Transportation Board

The STB oversees the economics and structure of the railroad industry. Deregulation under the Staggers Rail Act of 1980 relieved freight carriers from most, though not all, federal regulation of rail rates and services and simplified the regulatory process associated with railroad mergers, line sales, and abandonments. In the past, shippers wanting to appeal rail freight rates to the STB have found such appeals to be costly, time-consuming, and seldom resolved in their favor. Under the Obama administration, the STB has sought to simplify and streamline shippers' access to the agency, making it easier for relatively small rail shippers to express grievances. The STB has also implemented reduced filing fees and expedited processes for handling smaller claims.

Federal Railroad Administration

The FRA is the principal agency within the US Department of Transportation responsible for railroad policy and communications, safety, and development. The FRA's Office of Railroad Development has a variety of responsibilities, such as overseeing funding for Amtrak and its capital projects, managing grant and loan programs and National Environmental Policy Act compliance, and conducting research and development functions.

The activities of the Office of Railroad Development were significantly expanded by passage of the Passenger Rail Investment and Improvement Act (PRIIA) and American Recovery and Reinvestment Act of 2009 (ARRA). These new programs added policy and vision development for intercity and high-speed passenger rail and solicitation and award of grants, including the initial $8 billion designated for HSIPR.

The FRA's Office of Railroad Safety is responsible for developing and enforcing railroad safety statutes, regulations and standards; maintaining comprehensive railroad accident reporting systems and databases; and conducting safety-related analyses and investigations.

The FRA established nine levels or classes of track maintenance standards that prescribe the maximum speed of operation for both freight and passenger trains, based on a number of different factors, but primarily the quality of the track as measured against the benchmarks for the class of track the railroad operator has elected to sustain. In Oregon, the highest class of track being operated is Class 5. See Table 2.1 for a comparison of track classes and their corresponding speed limits.

Table 2.1 Maximum Speed of Trains by FRA Track Class

Class of Track	Maximum Allowable Speed for Freight Trains	Maximum Allowable Speed for Passenger Trains
Excepted Track	10 mph	N/A
Class 1	10 mph	15 mph
Class 2	25 mph	30 mph
Class 3	40 mph	60 mph
Class 4	60 mph	80 mph
Class 5	80 mph	90 mph
Class 6	110 mph*	110 mph
Class 7	125 mph*	125 mph
Class 8	150 mph*	150 mph
Class 9	200 mph*	200 mph

* Freight may be transported at passenger train speeds if safety requirements are met. Equipment used for freight rail currently do not meet these requirements.

CHAPTER 3 Rail Infrastructure

Oregon's rail system is part of a nationwide, interdependent system of rail infrastructure, train operations, and flows of commodities. This chapter documents the state's rail infrastructure, while the following chapter discusses freight train operations and commodity flows. Oregon has about 2,400 miles of railroad track in operation, owned and/or used by 23 railroad companies composed of two Class I carriers and 21 shortlines. (See Chapter 2, Background, for definitions of the classes of carriers.)

The infrastructure of a rail network includes all of the physical facilities needed to operate the network and consists of track and structures (tunnels, bridges, and stations), rail yards, signals, and communication facilities.

The long-term viability of rail companies depends in large part on the condition of their physical infrastructure. The industry's fixed costs are relatively high compared to other industries; for example, the railroad industry invests nearly 17 percent of operating revenues on maintaining its physical assets, compared to nearly 13 percent for electric utilities and five percent for mineral extraction, the next most-capital-intensive industries. Deteriorating conditions limit the weight of loads that a company's trains can carry and the speed the trains can travel. Delayed maintenance consequently affects profitability.

Given the importance of the rail industry to Oregon's economy (in 2008 the rail industry in Oregon employed over 2,000 people and moved over 61 million tons of freight[8]), it is important to understand the conditions of the rail infrastructure. When a rail line is out of service, alternative service is usually limited or doesn't exist at all, leaving businesses at risk of not being able to secure a competitive shipping option. Oregon is committed to rail as a key part of the overall transportation network and a key part of the economy. If there are problems, it is important to know whether and how much state investment may help to maintain or restore vital links in the overall transportation system. (For a discussion of state ownership, see Chapter 8, State Ownership, and for an evaluation of funding options for investment in the rail sector, see Chapter 9, Funding Options and Return on Investment.)

The Oregon Class I carriers—BNSF and UPRR—are known to have capacity issues. Train delay ratios in the Portland area are proportional to conditions seen in the much larger and denser Chicago rail system, but their lines are well-maintained and even have the resources to repair from major disasters. For example, in 2008 a landslide shut down the UPRR mainline near Oakridge, OR for four months. UPRR immediately mobilized a 200 person work crew to repair the damage and remove over 19 million cubic feet of mud. This unplanned repair cost over $100 million. In contrast, the shortline railroad companies have trouble generating sufficient revenue to maintain their lines. In other words, the shortline infrastructure has condition issues but does not have capacity issues, with the exception of capacity constraints on the PNWR between Wilsonville and Beaverton.

The FRA regulates track condition on all railroads. The state inspects track condition in accordance with the federal inspection program, so data is available on track conditions.

8 *Freight Railroads in Oregon 2008*, Association of American Railroads, February 2010.

However, the FRA does not regulate bridge and tunnel conditions. So little is known about bridge and tunnel condition, especially on the shortlines where maintenance programs are not as robust. The *Oregon Rail Study* focused on the state of maintenance on the shortlines, specifically the bridge and tunnel conditions, and are reviewed later in this chapter.

National Rail Network

The country's rail network has declined by 45 percent from its peak of 254,000 miles in 1916 to 140,249 in 2007. As shown on Figure 3.1, rail networks are dense in the eastern half of the country, with heavily used corridors running east-west and north-south. In the west, rail corridors are sparsely distributed, and predominant traffic corridors are east-west. There are seven Class I railroads operating in the US, shown in Table 3.1.

Table 3.1 Class I Railroads Operating in the US

Railroad	US Route Miles	Revenue Ton-Miles (billions)	Freight Revenue ($ millions)	Locomotives in Service
BNSF Railway	32,154	595	$12,846	5,751
Canadian National Rail Service (CN)	6,736	54	$1,422	716
Canadian Pacific Railway (CP)	3,511	24	$687	372
CSX Corporation	21,357	247	$7,689	3,601
Kansas City Southern Railway Company (KCS)	3,197	25	$800	565
Norfolk Southern Corporation (NS)	21,184	203	$8,526	3,655
Union Pacific Railroad (UPRR)	32,426	549	$13,545	8,119

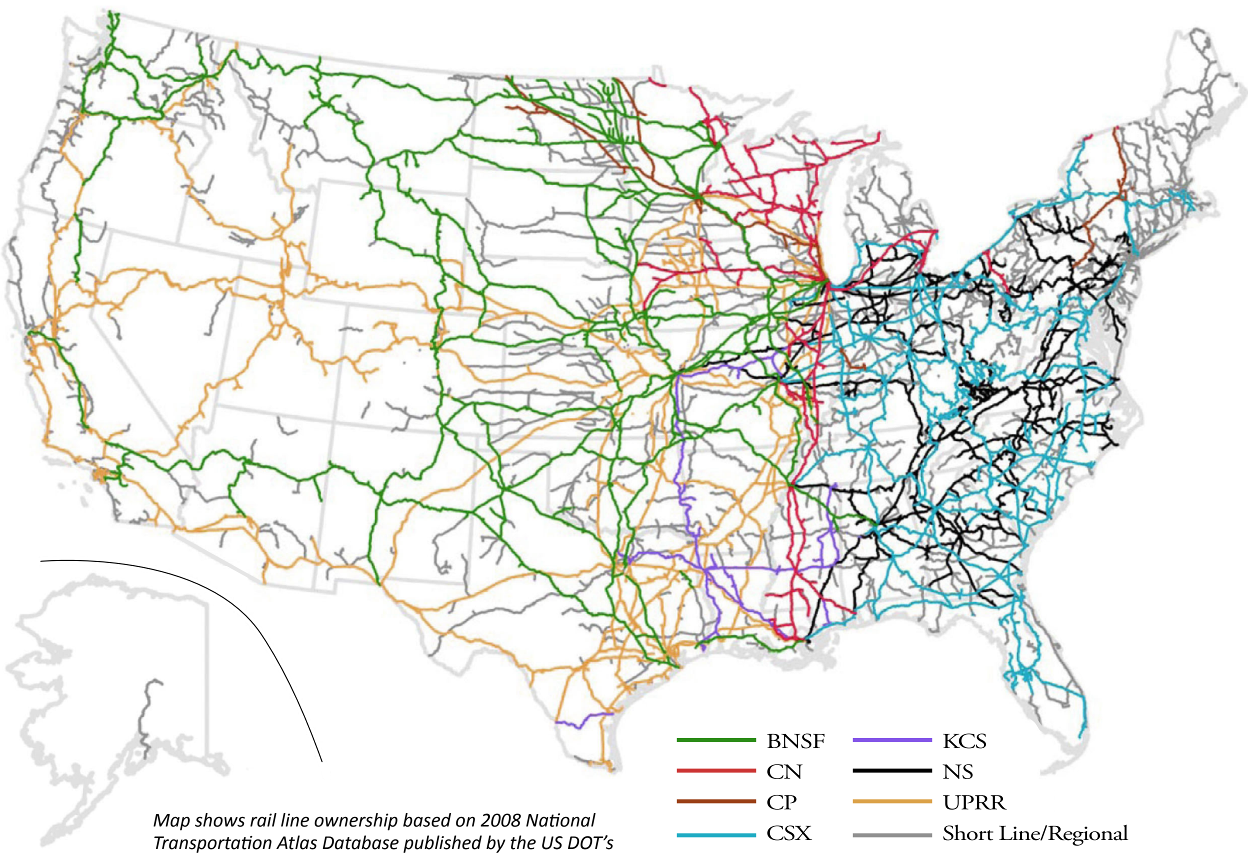
National railroads use their mainlines to transport products between major rail yards. At the yards, there are extensive networks of facilities to allow trains to be disassembled, cars sorted by destination, and new trains assembled.

Because the industry became more profitable in the years preceding the economic downturn of 2008-2009 (see Chapter 4 for a discussion of revenue trends), the Class I railroads appear to have sufficient funds for investing in their infrastructure. Major investments in infrastructure to increase capacity were made in the last several years in their top priority corridors. Most main tracks are in good condition and, where passenger trains are hosted, allow passenger speeds up to 90 mph (79 miles per hour in Oregon) depending on the type of signal system in use.

Despite recent investments, several major national bottlenecks remain in major metropolitan areas such as Chicago and Los Angeles. Innovative public-private partnerships in Los Angeles and Kansas City relieved some rail congestion through development of shared, toll-based rail facilities. A new initiative in Chicago, the Chicago Region Environmental and Transportation Efficiency Program (CREATE), will produce significant new operating efficiencies in what has long been the nation's biggest bottleneck for passenger and freight rail services.

In the Pacific Northwest, regional bottlenecks exist in the Puget Sound region, the Portland area including the corridor between Vancouver, WA and Portland, as well as sections of the BNSF between Seattle and Portland, and the UPRR corridor in northern California. UPRR has invested in upgrading tracks in the Blue Mountains east of Pendleton and in the Portland area between Brooklyn Yard and Oregon City. BNSF has invested in additional track in the I-5 corridor between Vancouver and Seattle, WA. The Freight Action Strategy for Seattle-Tacoma (FAST) Corridor Partnership in the Puget Sound region has invested over half a billion dollars in highway, port and rail freight projects since 1998.

Figure 3.1 US Railroad Network



Map shows rail line ownership based on 2008 National Transportation Atlas Database published by the US DOT's Bureau of Transportation Statistics.

CLASS I RAILROAD NETWORKS IN OREGON AND WASHINGTON

BNSF and UPRR are the nation's two largest railroads and the only Class I railroads with facilities in Oregon. Their vast networks across the western two-thirds of the US can be seen in Figures 3.2 and 3.3.

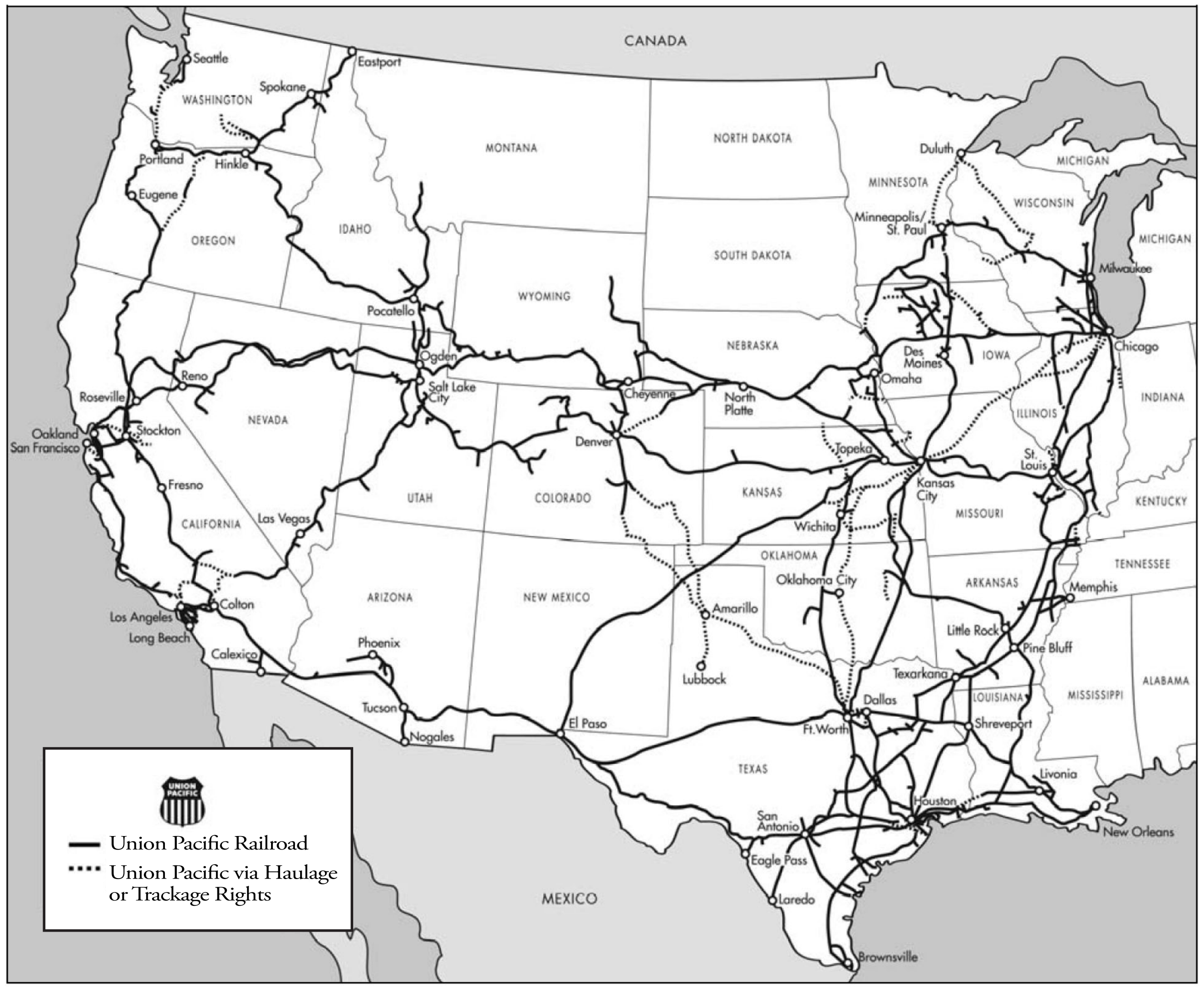
The top 10 intermodal and carload (classification) yards[9] for UPRR and BNSF are outside Oregon. The nearest UPRR major intermodal terminal yard is in Seattle. The nearest major BNSF intermodal terminal is in Stockton, in central California. BNSF has a large classification yard in Pasco, WA and UPRR operates one at Hinkle, OR near Hermiston.

Figure 3.2 BNSF Rail Network

Source: *2008 Annual Report and Form 10-K,* Burlington Northern Santa Fe Corporation, 2009, accessed August 17, 2009. http://www.bnsf.com/investors/annualreports/2008annrpt.pdf

9 A classification yard is where cars are sorted and grouped by destination. Intermodal cars typically hold containers of mixed or consumer goods. A carload is not less than five tons of one commodity.

Figure 3.3 Union Pacific Rail Network



Source: *2008 Annual Report and Form 10-K*, Union Pacific Corporation, 2009, accessed August 17, 2009. http://www.up.com/investors/attachments/secfiling/2009/upc10k_020609.pdf

Both UPRR and BNSF access the Pacific Northwest region through the Columbia River Gorge (see Figure 3.4), with a BNSF line on the north side of the Columbia River and a UPRR line on the south side. BNSF also has access to the region via Stampede Pass and Stevens Pass in Washington, and both railroads link the Pacific Northwest to Canada and California through Oregon.

UPRR track runs along the I-5 corridor from the Columbia River until just south of Eugene, where it diverges from that corridor toward Klamath Falls and south into California, as shown in Figure 3.4. BNSF track, known as the Oregon Trunk, runs north-south through central Oregon along the US 97 corridor. UPRR has greater north-south capacity in Oregon than BNSF, and much of the capacity is used by through trains from Washington and Canada to destinations in California and the Southwest. Klamath Falls has yard infrastructure for both carriers and serves north-south traffic. The location of the lines stems from the early development of the timber industry in the Northwest (for more information, see Chapter 2, Background).

Figure 3.4 BNSF and UPRR Systems in Oregon and Washington

RAIL YARDS IN OREGON AND WASHINGTON

The function of rail yards is to reconfigure trains for regional distribution. For example, trains from multiple cities arrive in Oregon with cars intended for Portland, Seattle, and Eugene. The trains are broken apart and all cars bound for Seattle are assembled in one train and all cars bound for Eugene are assembled in a different train. The size, location, and configuration of regional yards determine a railroad's operations and clearly can affect its efficiency and profitability.

Although there are many rail yards in Oregon, each Class I railroad has consolidated major operations to a few strategic locations. Growth in unit trains, which bypass intermediate yards, is one reason some yards are no longer needed. As a result, several yards across the state now serve as storage facilities or where intact trains can wait while other activities occupy the mainline. Today, a few key yards reconfigure trains for regional dissemination. Figure 3.5 shows rail yards in Oregon and nearby in Washington.

UPRR's Hinkle Yard, in northeast Oregon near Hermiston, is a significant aggregation/dissemination yard for UPRR trains into and out of the Pacific Northwest. BNSF's Spokane Yard in eastern Washington processes container trains and automobile trains for BNSF. BNSF's Pasco Yard in southeastern Washington handles carload/manifest[10] trains. BNSF also has grain storage tracks in Pasco where unit grain trains stop to change crews and queue until grain elevators along the Columbia River are able to receive them and unload the cargo. The rail yards play a key role in supporting the rail network and congestion around them can affect rail operations east and west.

BNSF yard operations for Oregon are in the Vancouver, WA Yard (for carload/manifest business), Lake Yard in northwest Portland (for intermodal), and Willbridge Yard in northwest Portland (for chemicals and petroleum products). "A" and "B" yards in north Portland adjacent to Port of Portland's Terminal 6 handle imported and domestic automobiles to and from port facilities and have the ability to handle ocean going containers transferring between vessel and rail modes.

UPRR has three yards in the Portland area, Brooklyn Yard in southeast Portland (for regional intermodal traffic), Albina Yard in central northeast Portland (for regional manifest traffic and locomotive service), and Barnes Yard in north Portland. Barnes Yard supports the Port of Portland and the Rivergate industrial area by switching and delivering automobile trains, grain trains, potash trains, and soda ash trains.

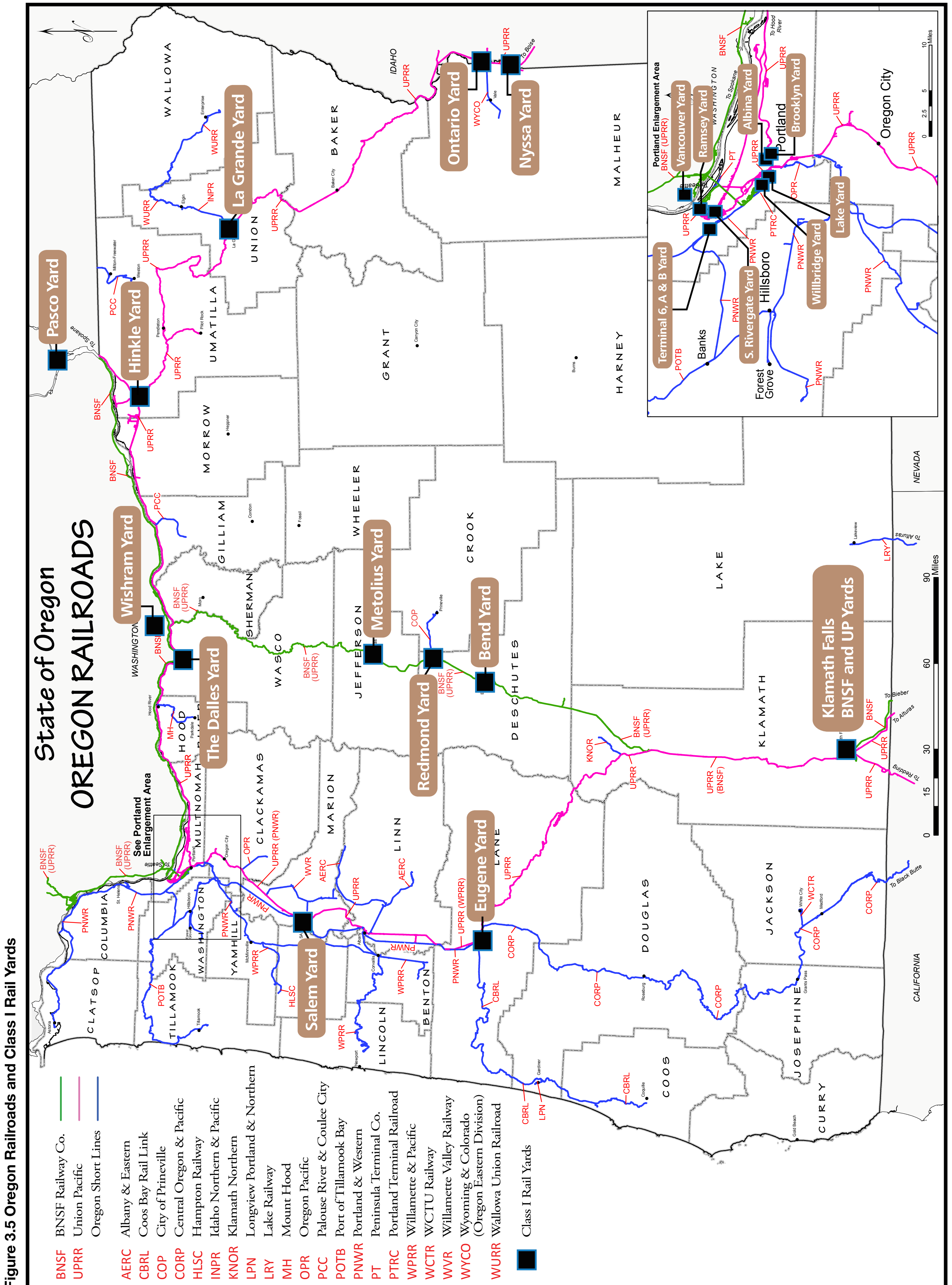
Oregon's Shortline Rail Network

Oregon hosts an extensive network of shortline railroads, particularly in northwestern Oregon, as shown in Figure 3.5. These rail lines were originally built in the late 1800s and early 1900s to support the forest and agrarian based economy. Since 1980, many shortline railroads were established when larger railroad companies sold off or leased less profitable portions of their systems. Today there are 21 shortline railroads. They continue to be a vital link between Oregon industries and the national rail network.

The following sections present the condition of shortline tracks, bridges, and tunnels as of 2008. Following the general discussion are maps of shortline railroads, Figures 3.9 through 3.24. One shortline, PTRC, owned jointly by BNSF and UPRR, is not shown on a map because as it only operates in Lake Yard and some nearby industrial trackage. Each figure provides additional details about track length, track class, bridge and tunnel conditions, and the estimated costs to upgrade or replace bridges and tunnels. Chapter 2 contains a list of the railroads in Oregon.

10 Manifest trains are scheduled merchandise freight trains; merchandise trains are any freight trains transporting freight other than bulk commodities.

Figure 3.5 Oregon Railroads and Class I Rail Yards



The *Oregon Rail Study* is the first effort to document existing conditions on all of the shortline railroads. Since deregulation, shortlines have typically generated enough revenue to cover their operating costs, but have struggled to generate enough revenue to cover capital maintenance. Given that many shortline railroad companies arose out of buying or leasing marginal Class I branch lines, it is perhaps not surprising that they tend to be more vulnerable. As a result, the condition of the infrastructure varies.

In Oregon, the climate and radical topography contribute to high infrastructure maintenance costs for some Oregon shortlines compared to shortlines in many other parts of the country. Western Oregon's wet climate accelerates deterioration of railroad tracks, thus increasing the cost to maintain the infrastructure. Also, mountainous grades and sharp curves add to operating and maintenance costs, because these challenging conditions reduce train speeds and increase the wear rate of rails and ties.

In addition, most Oregon shortlines have a substantial number of wood and steel bridges. Many of these bridges are reaching the end of their useful lives and, absent the funds for maintenance or replacements, bridge failures may result in the closure of some shortline routes.

Another issue for shortline railroads is the challenge of keeping up with federal standards for rail infrastructure and the evolving technologies for moving more goods. For example, rail carloads have become heavier requiring heavier rail, curves have widened to allow for faster train speeds, and rails are welded together and sometimes supported by concrete rather than wooden ties. Modern railroads are currently being designed to carry standard cars with a capacity of 115 tons that have a total weight on the rails of 286,000 pounds (sometimes referred to as 286K). Many of the older shortline railroads have tracks and bridges that are not capable of carrying such loads or of accommodating double-stack trains.[11] The type of rail may be too light, tunnels may be too low, or bridges in poor condition that cannot support the additional weight. This is a major constraint to optimizing the use of the shortline railroads for shipping. In its oversight of the transportation network, the state may have a role to play in assisting shortlines to overcome barriers to survival, expansion, and profitability. For that reason, the *Oregon Rail Study* not only assessed existing conditions, but also evaluated some of the potential costs needed to repair facilities and to upgrade them to carry the standard heavier and taller cars.

TRACK

The shortline railroads run on about 1,274 miles of the 2,400 miles of track across the state. Five of the 23 companies, BNSF, UPRR, PNWR, CORP and CBRL operate over 80 percent of all the track miles. The remaining have less than 100 miles of track each. Three companies, PT, PTRC and LPN, use as little as two miles of track and function more like terminal railroads by moving cars short distances between customers and connecting rail lines. Figure 3.5 is a map of the railroads operating in Oregon.

11 Double-stack cars are specialized flat-bed railcars that can carry two freight containers stacked one on top of the other. Freight containers are easily transferred between ships and trucks.

Rail used for railroads is graded by weight over a standard three-foot length. Heavier rail can support greater axle loads and higher train speeds without sustaining damage than lighter rail can, but it costs more. For example, "130-pound rail" would weigh 130 pounds per yard. The preferred range is 115 to 141 pounds per yard. Eighteen percent of Oregon's total track miles are 110 pounds per yard or less, all but 6 miles are on the shortlines. Rail is produced in fixed lengths and needs to be joined end-to-end to make the continuous rail surface. The traditional method is bolting ends with joint bars producing jointed rail. A more modern method, particularly where higher speeds are required, is welding the ends, which produces "continuous welded rail" (CWR). The benefit of CWR is significantly lower maintenance costs, both labor and materials.

The FRA classes of track prescribe the maximum speed of operation for both freight and passenger trains and are presented in Chapter 2, Background, Table 2.1. Shortline railroad tracks are generally either FRA Class 1 or 2, or they are labeled as "Excepted." Of the 1,274 shortline miles, 750 miles is Class 2, and most of it belongs to or is leased by the three largest companies PNWR, CORP and CBRL. Most of the very small mileage shortlines are either Excepted or Class 1 track. These three categories allow speeds ranging from 10 mph to 25 mph for freight trains. By comparison, the Class I railroads typically travel on Class 3 or 4 track, as a minimum, permitting speeds of 40 to 60 mph.

Rail line operators are allowed to change the classification of their track at any time by notifying the FRA. The Excepted category provides some relief from monetary penalties under certain FRA regulations, in areas such as drainage and vegetation, track structure and track geometry (curves), and condition of rail. However, inspections must occur as frequently for Excepted tracks as for the Class 1 and 2 tracks. Operators may decide to classify their track as Excepted where the lines are lightly used and do not require the same level of attention as track under heavier use. Occupied passenger trains and large quantities of hazardous cargo may not be carried on Excepted track. The opportunity to exempt track in certain situations allows marginal operators to continue service to shippers on lines that might otherwise have to be abandoned.

Figures 3.6 and 3.7 summarize the shortline railroads by length of track miles and percentage of carloads carried. The data is sorted from highest to lowest, beginning with the companies operating the most track miles or carrying the most carloads.

Figure 3.6 Ranking of Shortline Railroads by Length of Track Miles (2010)

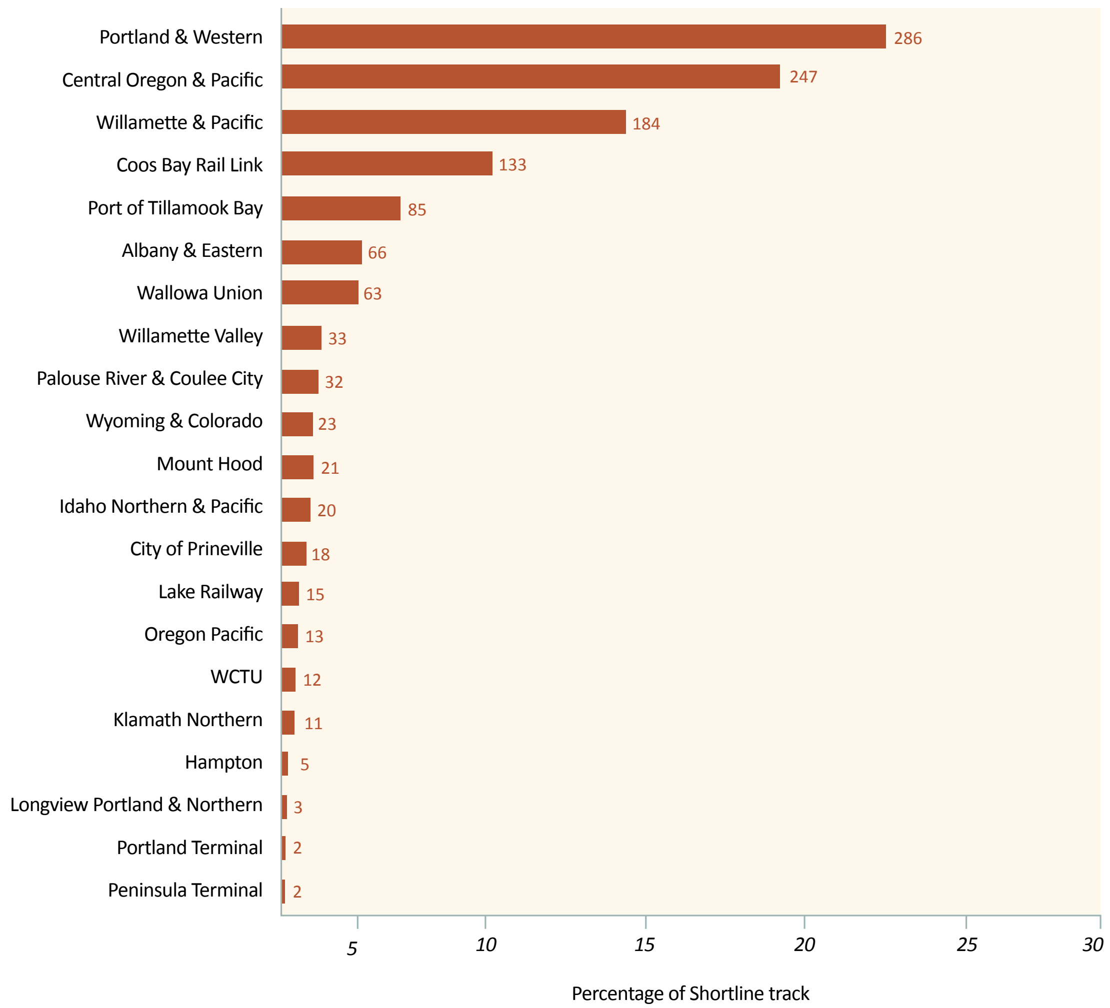
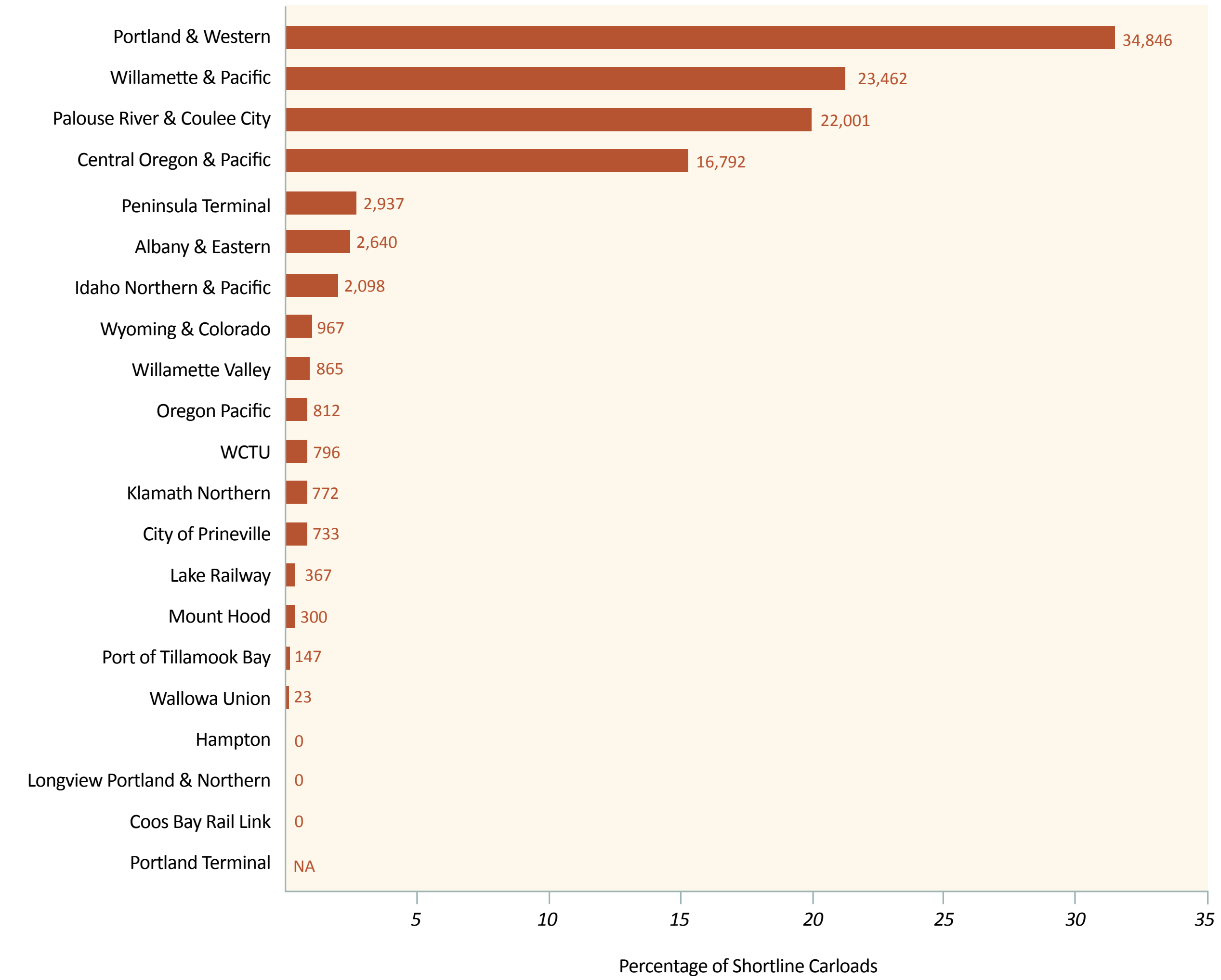


Figure 3.7 Ranking of Shortline Railroads by Carloads Carried (2009)



Figures 3.9 through 3.24 illustrate the shortline railroad routes and provide a brief description of the operating and infrastructure characteristics.

BRIDGES

The existing conditions of 332 bridges located on 15 shortline railroads in Oregon were assessed in 2008, see Appendix B. The 332 bridges are comprised of 534 segments. In general, this study included all bridges over 100 feet-in-length, 15 feet off the ground surface, and all steel bridges on these railroads. Many longer bridges are actually comprised of a series of different bridges or segments. Therefore, the assessment was broken into segments, as each segment often had a different state of maintenance as well as different structural material (timber, concrete, steel).

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. The assessment involved a review of previous bridge inspection records provided by the railroad companies, recent visual inspections of 72 bridges (ground-truthing), and interviews with railroad personnel.

The rail industry does not have a standard to rate the condition of bridges or categorize a state of maintenance. Good condition means there are no apparent deficiencies, fair means there are minor deficiencies, and poor means there are significant deficiencies where the load capacity may be affected. An estimate of the remaining life span of the bridges was also created.

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 3.2 for each shortline railroad company.

Table 3.2 Costs to Upgrade, Repair and Replace Shortline Bridges (Ranked by Cost)

	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

Note: Site-specific considerations to account for detailed site constraints or bridge conditions are not included in these planning level cost estimates.

LOAD CAPACITY

Capacity rating of railroad bridges dates to the late 19th century. Currently, a load of 80,000 pounds maximum per axle is used. In rating bridge capacity, there are varying loads experienced by the bridge based on the speed of the train, the composition of the bridge, and the type of locomotive. For the *Oregon Rail Study*, bridges were evaluated for their ability to carry specific loads depending on the material of the structure (concrete, timber or steel).

Speeds also factor into the impact to a bridge when carrying a train. Freight trains, especially on shortline railroads, routinely slow down when crossing potentially substandard bridges, because slower speeds reduce the amount of dynamic impact load on the bridge, making the crossing safer. The bridge analysis looked at what it would cost to upgrade bridges to allow a design speed of 10 mph and 25 mph to enable the bridges to safely handle loads greater than 286,000 pounds. The higher speeds contribute to velocity, a measure of efficiency used in the rail industry.

12 Many longer bridges are comprised of a series of different bridges or segments; therefore, this data is broken into segments as each different segment can and often did have a different state of maintenance as well as different structural material (timber, concrete, steel).

LIFE SPANS

There is no standard in the bridge industry to estimate the remaining life of a railroad or highway bridge. All bridges, if continuously rehabilitated or repaired, have an indefinite service life. However, not all owners maintain their bridges that way. To make a conservative estimate, the *Oregon Rail Bridge Assessments*, located in Appendix B, assumed that only routine maintenance will be conducted by owners/operators until the bridge becomes unserviceable. In other words, the assessment estimated how long the bridges would last until significant reinvestment would be required to continue service.

The remaining life of each bridge segment was estimated based on its present condition combined with the effects of routine maintenance. In addition, the age of the bridge was used to estimate the likelihood of existing but undetected deterioration that could further reduce the life span. For example, even if some supports have been replaced, the remaining original support structures will determine the bridge's remaining life span.

The different types of material used in bridges (concrete, wood, metal) deteriorate at different rates under similar environments and uses. Timber is considered to have the shortest useful life mostly because of decay from rot and insect damage. Concrete has the longest useful life of the three materials. Concrete deteriorates when reinforcing steel is exposed and then corrodes and fosters progressive cracking and spalling.

Early repair of damage tends to prolong bridge life. As the deterioration of material progresses, the rate of deterioration tends to accelerate. That is, the period of time for a bridge to change condition from fair to poor is less than that to change from good to fair.

The 332 bridges included in the assessment are comprised of 534 segments. Twenty-two percent of the total studied segments had only five years of remaining lifespan. Bridge segments with 10 years remaining totaled eight percent, thirty percent had 15 years remaining, 18 percent had 25 years remaining, nine percent had 30 years remaining, and 13 percent had 45+ years remaining.

As noted earlier, an important aspect of future viability of the shortline railroads is double-stack clearance. Double-stacked clearance allows for movement of containers for intermodal shipping, the fastest growing rail commodity market. All bridges measured were found to have adequate vertical clearance, and no upgrading for that purpose would be required.

An important result of the study was that information pertaining to bridge conditions was matched to evidence from visual inspections. Some companies' inspection reports had good details of conditions, the inspections were performed by a qualified inspection consultant, and maintenance history was available. Other railroads had incomplete inspections or records. Sometimes the qualifications of the inspectors were unclear. Some companies apparently do not have maintenance records for all of their bridges. As a result of the compilation of bridge assessments, ODOT also has additional information on the inspections history for each of the shortline railroads.

The research provides an essential database for the 332 bridges studied that had not previously existed. The structure of the database on the 332 bridges will allow ODOT to expand it to include additional rail bridges as the need arises. It is essential that ODOT understand the bridge maintenance needs to inform future state investment decisions and the impact of the new federal bridge regulations being considered by the FRA.

TUNNELS

Oregon's rail system has 68 tunnels, of which about half are on the shortline network. The *Oregon Rail Tunnel Assessment*, located in Appendix C, evaluated 24 out of 34 tunnels on shortline routes. The 24 tunnels are distributed on three lines: CORP (11), PNWR (4), and CBRL (9). The ten remaining tunnels are on the POTB and were not included in this evaluation because of the storm damage in 2007 that left the line inaccessible and the Port's ongoing evaluation with the Federal Emergency Management Agency (FEMA).

The tunnel reconnaissance asked three questions: what is the tunnel's existing condition? Can it accommodate double-stack trains? What work would be required to provide the tunnel with a 20-year life span?

Following the assessment of each tunnel, cost estimates were developed for repairing the tunnel 1) to achieve a 20-year life expectancy, and 2) to upgrade the tunnel to accommodate double-stack rail cars.

The lengths of the 24 tunnels vary widely ranging from 128 feet long to 4,202 feet long. In all, the study looked at nearly six miles of tunnels. Clearly, the locations of the tunnels, their length, and their state of repair (or disrepair) figure highly in the rehabilitation costs and risk to the system.

Like the bridges, the tunnels date from different decades, some are over 100 years old, and are variously built and patched with the three main construction materials of wood, steel and concrete. Not surprisingly, given the history of railroad development (see Chapter 2, Background), the tunnels were found to be in various stages of repair. Tunnel safety and stability depend on how the tunnels are lined (with wood, concrete or steel); the condition of the liner; how the liners have been affected by drainage, groundwater, and soil or rock conditions.

NEED FOR REPAIR

Condition was assessed by visiting most of the tunnels and reviewing drawings, maps and construction data. Nearly half of the tunnels (11) require significant rehabilitation to provide another 20 years of service. Urgent, near-term replacement is needed for moderately to highly deteriorated timber linings in 12 percent or 3,700 linear feet of the tunnels. Figure 3.8 shows all the tunnels, those studied, and those requiring rehabilitation. Site observations and previous experience indicate that weakened and fractured rock in 20 percent of the timber-lined portions of tunnels can be expected to require new steel sets.[13] The key recommendation for prolonging the service life of the tunnels is to remove all exposed timber ribs and support the exposed rock with grouted rock bolts and shotcrete. Improving drainage by cleaning ditches and pipes and re-grading to convey water away from the tunnels, as well as timely repair of the tunnels when damaged by fire or other extreme conditions or accidents, can lengthen the life of the tunnels to over 50 years. Appendix C makes specific and detailed recommendations for each of the tunnels studied. Since this assessment, CBRL has improved four of their nine tunnels with funds from ARRA, approved by the Oregon Transportation Commission in 2009.

Twenty-one of the 24 tunnels require some degree of modification to accommodate double-stack rail cars. Cross-sections of tunnels provided by the railroads were used to determine clearance. Old timber sets and low-hanging rock or concrete bumps are the most common impediments, and these vary in depth from a few inches to over four feet. About 90 percent of the concrete portal barrels[14] are also height restricted for double-stack rail cars. Only three tunnels—the CORP Tunnel 2, CBRL Tunnel 15, and PNWR Tunnel 0—are currently in good condition and require no repairs or excavation to satisfy double-stack clearance criteria.

The method for creating additional clearance depends on site-specific conditions. Making minor shifts in the track and thinning the ballast section, grinding off bumps, or notching the arch overhead may add the necessary few inches. More drastic measures to create more space include lowering the tunnel floor or excavating and replacing the arch of the tunnel. Timber or steel sets in some cases would need to be replaced. Enlarging the tunnel crown or undercutting by more than a few inches could entail stabilizing the lining and anchoring it to the bedrock. Several tunnels on CORP will require blasting in order to create additional clearance.

COSTS TO REPAIR AND UPGRADE

For the 24 tunnels that were studied, the cost of creating sufficient clearance, combined with repair and maintenance of the existing tunnel linings for additional service life, is estimated at $92 million. This cost assumes that the repairs can be accomplished while the track is not in use ("dead-track" conditions). Allowing even one train per day ("live-track" conditions) during construction could add 15 to 25 percent to the costs, while multiple trains could double or triple not only costs but also serve to extend the work period.

13 A set is an arched or segmented individual steel or wood frame used in tunnels to support the excavation at discrete intervals, typically spaced two to five feet apart, depending on the condition of the ground.

14 Portals are the normally-reinforced entrances to the tunnels, frequently an arch or barrel shape.

Figure 3.8 Oregon Railroad Tunnels

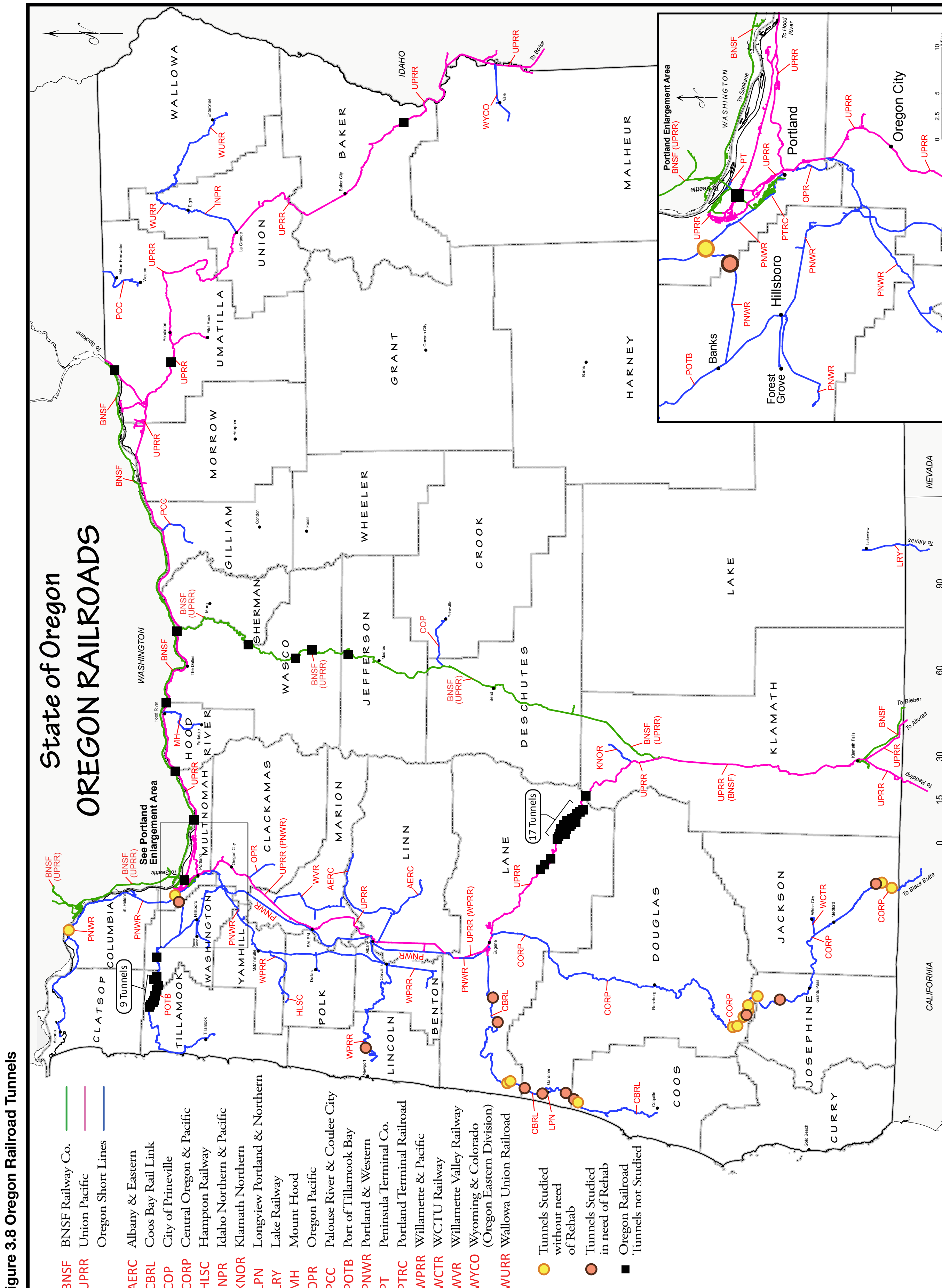


Table 3.3 Costs to Repair Tunnels and Create Double-stack Clearance

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

Summary of Rail Infrastructure Studies

The Class I railroads operate vast networks across the country and are vital to the national and local economies. Oregon's Class I railroads are BNSF and UPRR. Both railroads are financially sound and well-positioned to recover when shipping volumes return to pre-recession levels. While traffic is currently low, they have continued to invest billions in maintenance improvements. The mainlines are in good condition and, where passenger trains are hosted, allow speeds of up to 79 mph. Their future is potentially constrained by capacity issues, but not condition issues.

Shortline carriers play an important role in connecting smaller communities and shippers to the national rail system. In contrast to the Class I railroads, Oregon's shortlines have available capacity, but the capital intensive nature of the business combined with deferred infrastructure maintenance and the recent market declines present multiple challenges. The existing conditions of shortline track, bridges, and tunnels were assessed as part of the *Oregon Rail Study*.

The tracks operated by shortlines are classified as Excepted, Class 1, or Class 2. Forty percent are Class 1 or Excepted, allowing speeds of only 10 mph. Upgrades—for example to ease curvature or improve track structure—would be needed to allow faster speeds. Estimates to upgrade all of Oregon's low density network for 40 miles per hour freight operation range between $150-600 million ($500,000-$2 million per mile).

An assessment of 332 bridges revealed that 21 percent are in "good" condition, 50 percent are in "fair" condition, and 29 percent are in "poor" condition. To upgrade all of these bridges to a 20-year life expectancy and handle heavier loads at 25 miles per hour would cost about $142 million. To replace all 332 bridges would cost about $1.4 billion.

Similar to the bridge study, the investigation of tunnel conditions focused on costs associated with rehabilitation to 20-year life expectancy and upgrading to allow double-stacked cars. Twenty-four of the 68 tunnels railroad tunnels in Oregon were studied. All 24 are located on the three largest shortlines: PNWR, CORP and CBRL. Eleven of the 24 require rehabilitation to extend their life to 20 years, at an estimated cost of $32 million. All but one would require updating to allow for double-stacked railcars at an estimated cost of $92 million.

Figure 3.9A Albany & Eastern Railroad Company

Albany & Eastern Railroad Company

Infrastructure

Track

Track: 66 miles
- Excepted: 66

Bridges

Bridge Segments Studied: 8
- Fair Condition: 5
- Poor Condition: 3

Cost to upgrade bridges to 286K cars:
- @ 10 mph: $491K
- @ 25 mph: $491K

Cost to replace bridges: $7.5M

Operations

LOCAL FREIGHT SERVICE

One round trip between Bauman and Albany, Monday through Friday.

One round trip between Mill City/Lyons and Lebanon, two times per week as needed.

AT RISK CORRIDOR*

The Sweet Home branch from Bauman to Sweet Home may be at risk due to low traffic volumes.

* See Chapter 4, At Risk Corridors Section

Figure 3.9B Albany & Eastern Railroad Company

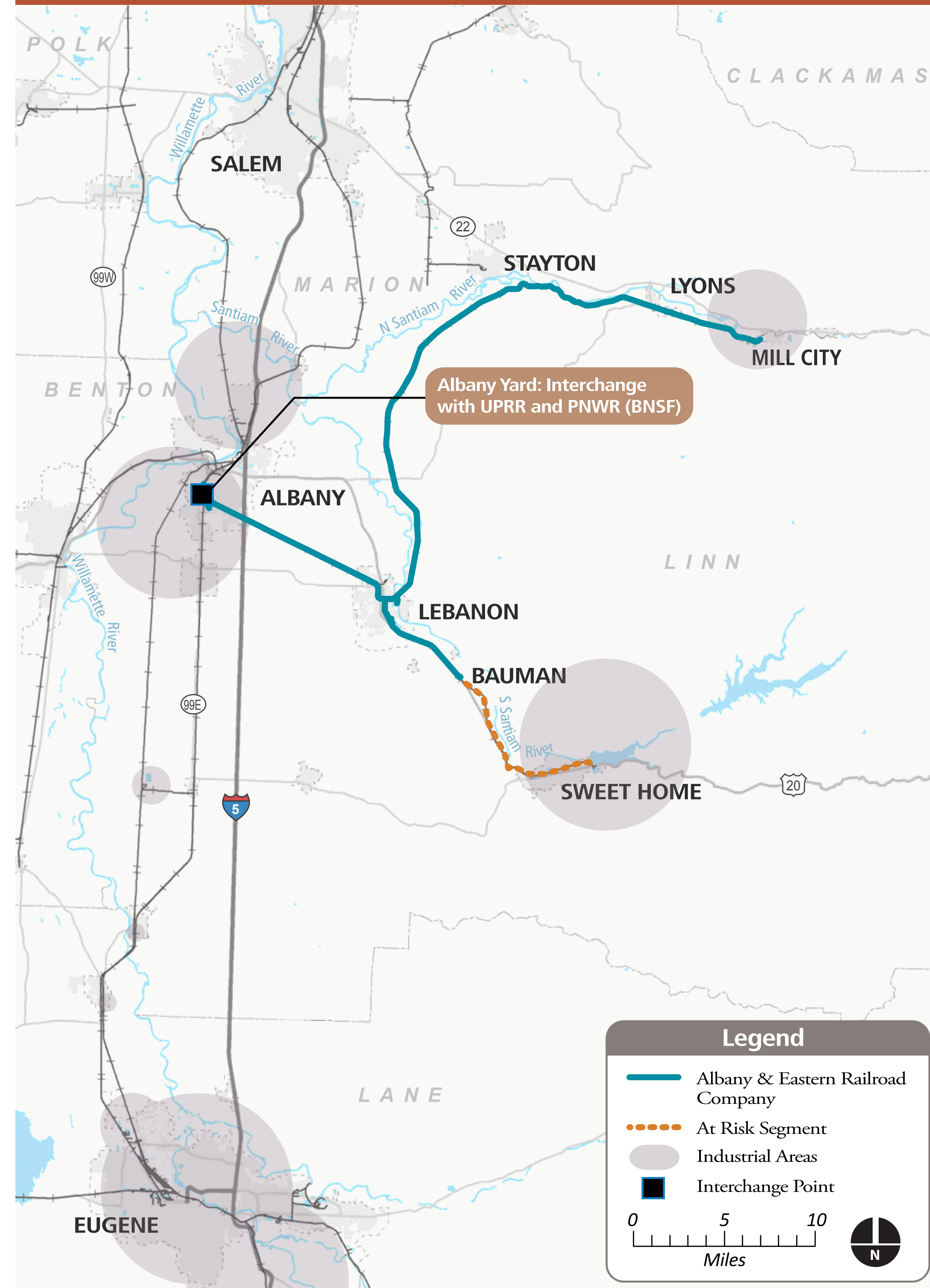
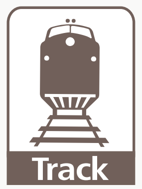


Figure 3.10A — Central Oregon & Pacific Railroad and WCTU Railway Company

Central Oregon & Pacific Railroad

Infrastructure

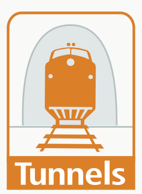


Track: 247 miles
- Class 2: 200
- Class 1: 47

Bridge Segments Studied: 72
- Good Condition: 13
- Fair Condition: 38
- Poor Condition: 21

Cost to upgrade to 286K cars:
@ 10 mph: $6.4M
@ 25 mph: $14.4M

Cost to replace bridges: $138.8M



Tunnels: 11

Cost to upgrade:
20-year life span: $4.9M
Double-stack cars: $35.4M

Operations

LOCAL FREIGHT SERVICE

One train north and one train south five days a week between:
- Eugene and Roseburg
- Dillard and Glendale
- Glendale and Medford
- Springfield and Cottage Grove
- Roseburg and Dillard
- Sutherlin and Roseburg
- Dillard and Riddle
- White City and Medford

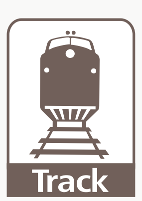
Note: No trains operate between Medford, Oregon and Montague, California.

AT RISK CORRIDOR*

Ashland, Oregon to Montague, California not being operated due to pricing actions. There is a general concern among some shippers that the line is at risk if business doesn't resume.

WCTU Railway Company

Infrastructure



Track: 12 miles
- Excepted: 12

Operations

LOCAL FREIGHT SERVICE

One train per day five days a week providing switching for industrial customers.

* See Chapter 4, At Risk Corridors Section

Figure 3.10B — Central Oregon & Pacific Railroad and WCTU Railway Company

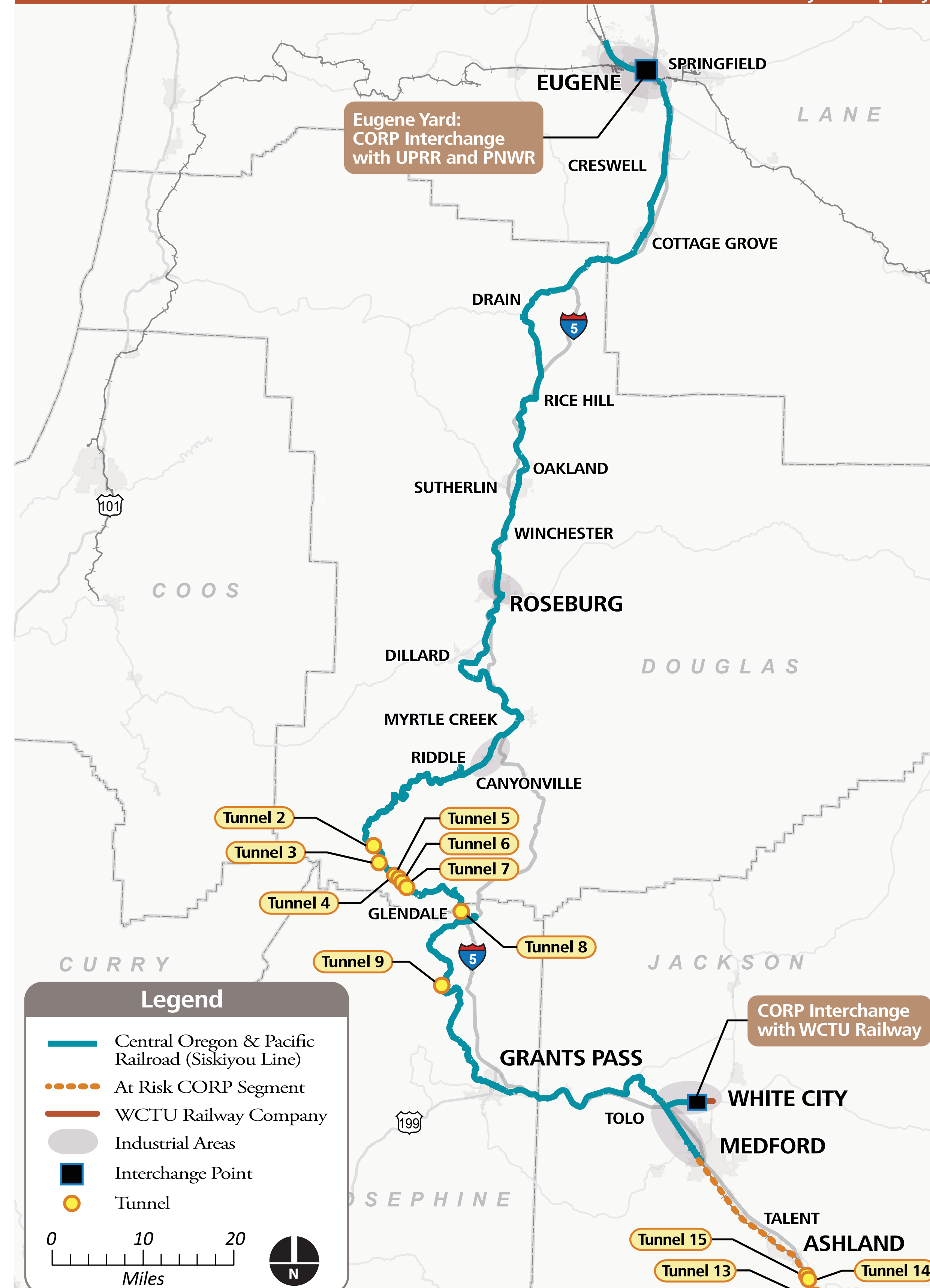


Figure 3.11A City of Prineville Railway

City of Prineville Railway

Infrastructure

Track: 18 miles
- Class 2: 16
- Class 1: 2

Bridge Segments Studied: 6
- Good Condition: 6

Cost to upgrade bridges to 286K cars:
@ 10 mph: $90K
@ 25 mph: $195K

Cost to replace bridges: $3.6M

Operations

LOCAL FREIGHT SERVICE

One round trip between Prineville Junction and Prineville three to five times per week.

Figure 3.11B City of Prineville Railway

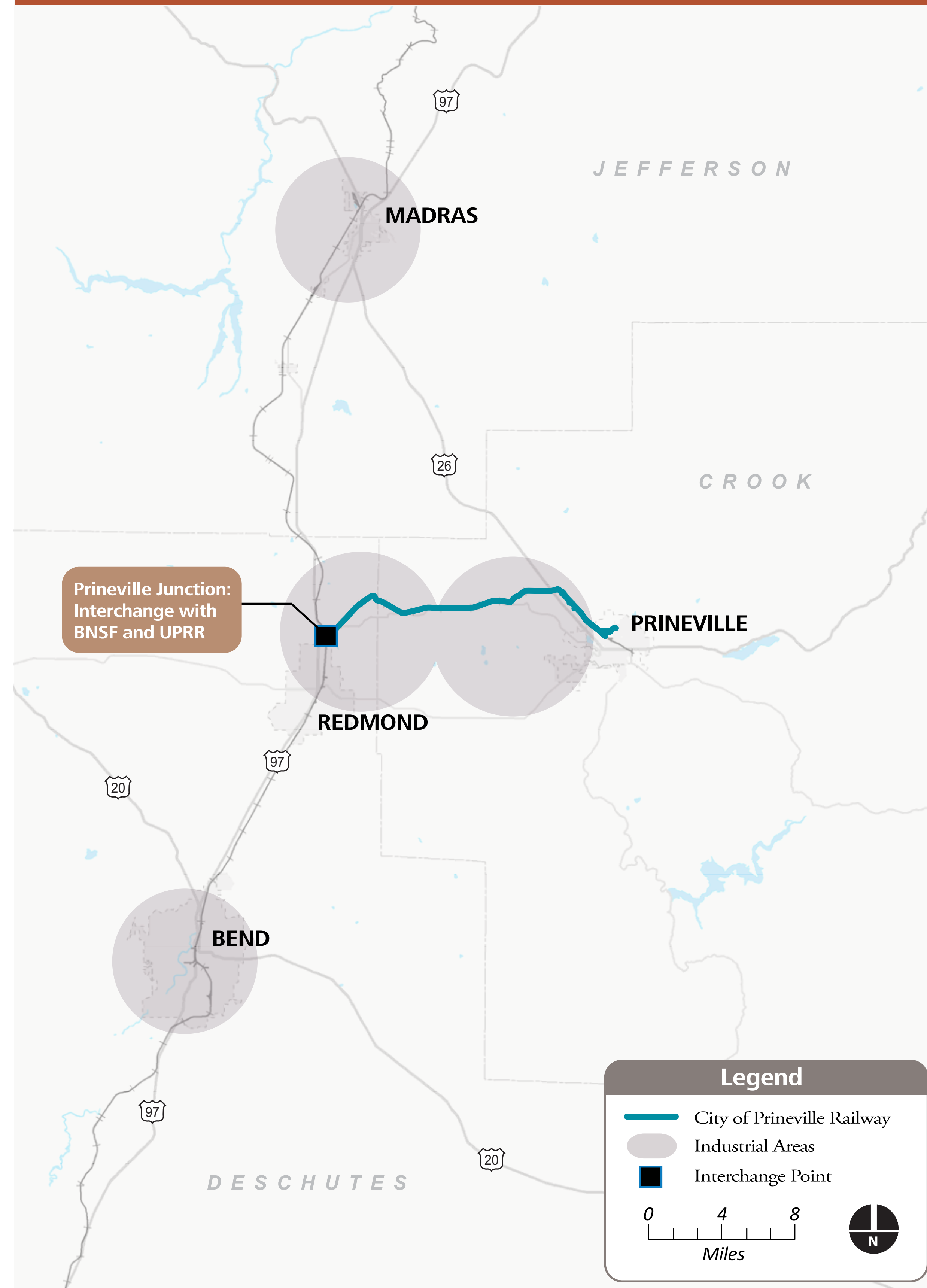


Figure 3.12A
Coos Bay Rail Link and Longview Portland & Northern

Coos Bay Rail Link

Infrastructure

Track: 133
- Not in Service: 133

Bridge Segments Studied: 110
- Good Condition: 5
- Fair Condition: 35
- Poor Condition: 70

Cost to upgrade bridges to 286K cars:
- @ 10 mph: $45.6M
- @ 25 mph: $47.6M

Cost to replace bridges: $462.2M

Tunnels: 9

Cost to upgrade:
- 20-year life span: $21.5M
- Double-stack cars: $49.7M

Operations

LOCAL FREIGHT SERVICE

Former owners embargoed the line in 2007 and in 2008 filed for abandonment. New owners purchased the line in 2009 and plan to restore service in 2011.

Longview Portland & Northern

Infrastructure

Track: 3
- Not in Service: 3

Bridges not studied

Operations

LOCAL FREIGHT SERVICE

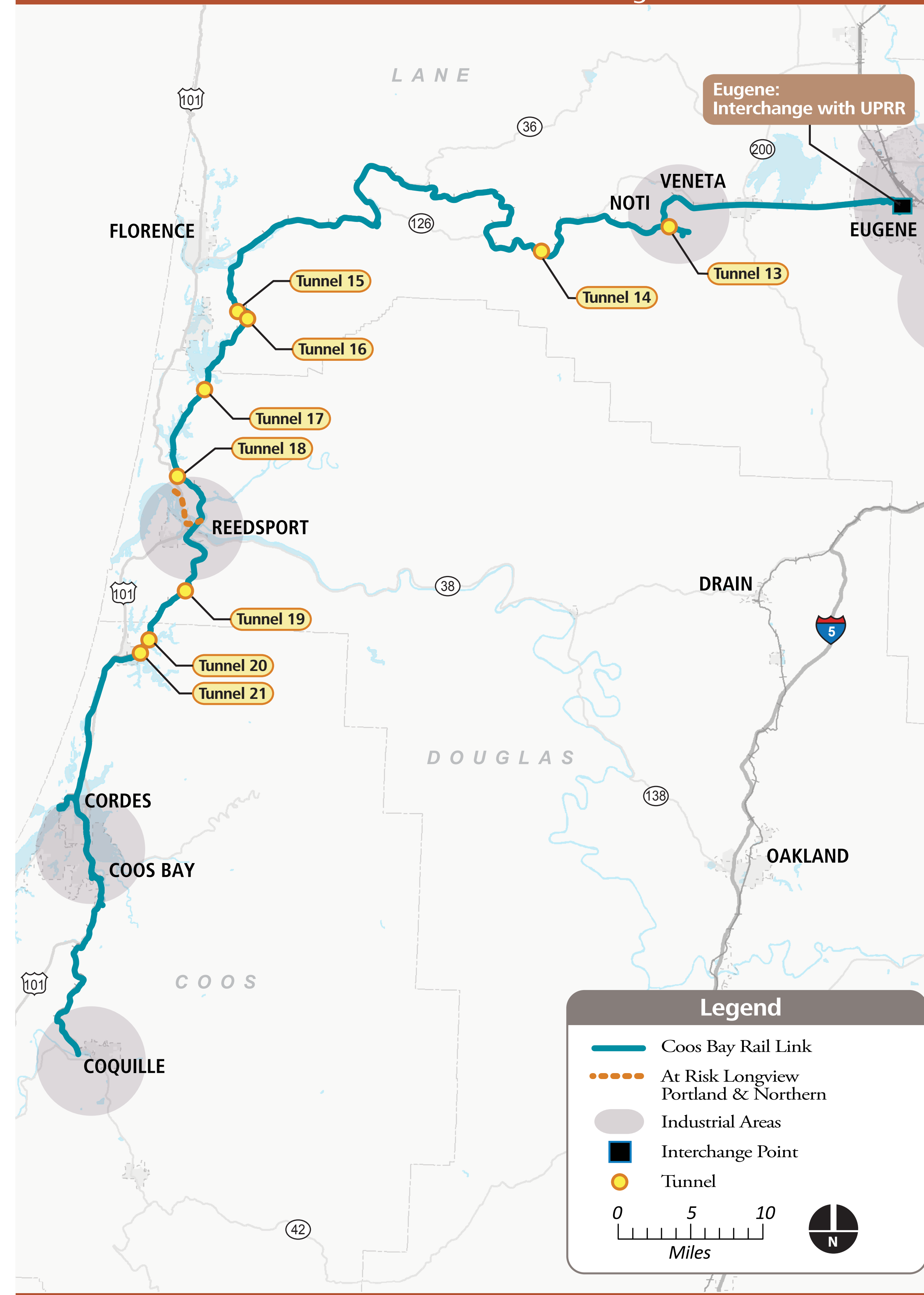
Out of service since 1998.

AT RISK CORRIDOR*

The entire line is at risk due to no traffic.

* See Chapter 4, At Risk Corridors Section

Figure 3.12B
Coos Bay Rail Link and Longview Portland & Northern



Idaho Northern & Pacific Railroad

Infrastructure

Track: 20 miles
- Class 1: 20

Bridge Segments Studied: 5
- Good Condition: 2
- Fair Condition: 3

Cost to upgrade bridges to 286K cars:
@ 10 mph: $382K
@ 25 mph: $382K

Cost to replace bridges: $5.8M

Operations

LOCAL FREIGHT SERVICE

One round trip per day between La Grande and Elgin.

Wallowa Union Railroad

Infrastructure

Track: 63 miles
- Class 1: 63

Bridge Segments Studied: 10
- Good Condition: 7
- Fair Condition: 3

Cost to upgrade bridges to 286K cars:
@ 10 mph: $81K
@ 25 mph: $81K

Cost to replace bridges: $11.4M

Operations

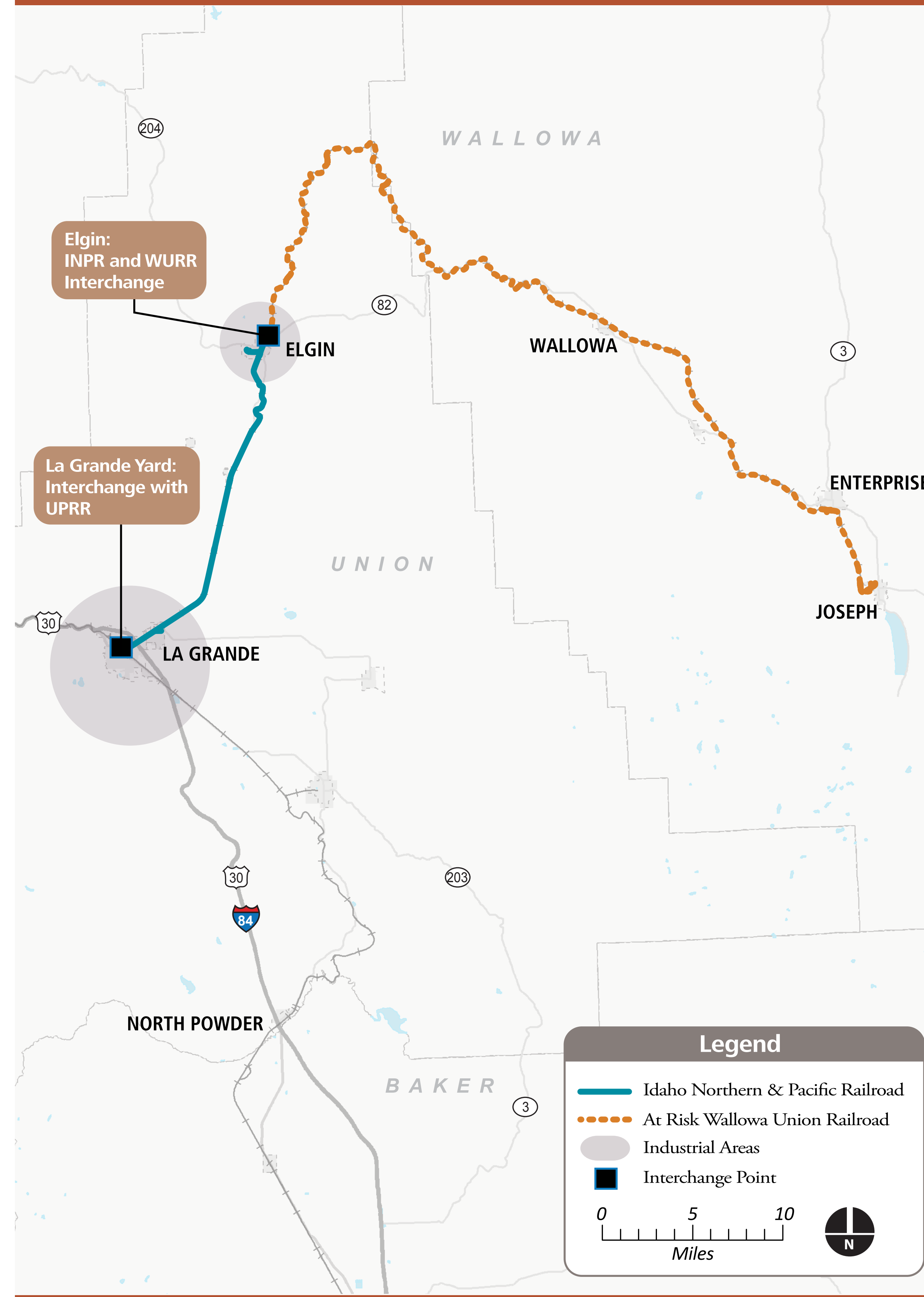
LOCAL FREIGHT SERVICE

None. Seasonal and on-demand excursion operations between Joseph and Elgin.

AT RISK CORRIDOR*

The entire line is at risk due to almost no traffic volumes.

* See Chapter 4, At Risk Corridors Section



Klamath Northern Railway

Infrastructure

Track: 11 miles
- Excepted: 11

Bridge Segments Studied: 1
- Poor Condition: 1

Cost to upgrade bridges to 286K cars:
- @ 10 mph: $16K
- @ 25 mph: $16K

Cost to replace bridges: $291K

Operations

LOCAL FREIGHT SERVICE

One round trip per day, sometimes two; average seven trains per week.

Figure 3.15A Lake Railway

Lake Railway

Infrastructure

Track

Track: 15 miles (Oregon)
119 miles (California)

- Excepted: 15 (Oregon)

Operations

LOCAL FREIGHT SERVICE

One trip from Alturas to Lakeview on Thursday and from Lakeview to Alturas on Friday.

All shippers on this 55-mile Alturas-Lakeview line are located in Lakeview.

AT RISK CORRIDOR*

Entire line at risk due to low traffic volumes.

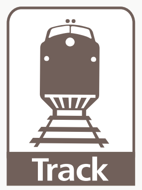
* *See Chapter 4, At Risk Corridors Section*

Figure 3.15B Lake Railway

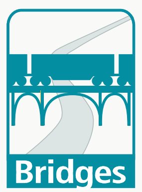
Figure 3.16A Mount Hood Railroad

Mount Hood Railroad

Infrastructure



Track: 21 miles
- Class 2: 3
- Class 1: 18



Bridge Segments Studied: 8
- Good Condition: 7
- Fair Condition: 1

Cost to upgrade bridges to 286K cars:
@ 10 mph: $155K
@ 25 mph: $155K

Cost to replace bridges: $12M

Operations

LOCAL FREIGHT SERVICE

Two round trip freight trains per week between Hood River and Parkdale.

One or two to five or six round trip passenger trains between Hood River and Parkdale per day, depending on season.

Figure 3.16B Mount Hood Railroad

Figure 3.17A Oregon Pacific Railroad

Oregon Pacific Railroad

Infrastructure

Track: 13 miles
- Class 1: 5
- Excepted: 8

Bridge Segments Studied: 9
- Fair Condition: 7
- Poor Condition: 2

Cost to upgrade to 286K cars:
@ 10 mph: $936K
@ 25 mph: $1M

Cost to replace bridges: $7M

Operations

LOCAL FREIGHT SERVICE

One round trip between Milwaukie and East Portland five times per week.

One round trip between Canby and Liberal three times per week.

AT RISK CORRIDOR*

The line from Liberal to Mollala is at risk. The track has been removed without STB approval.

* *See Chapter 4, At Risk Corridors Section*

Figure 3.17B Oregon Pacific Railroad

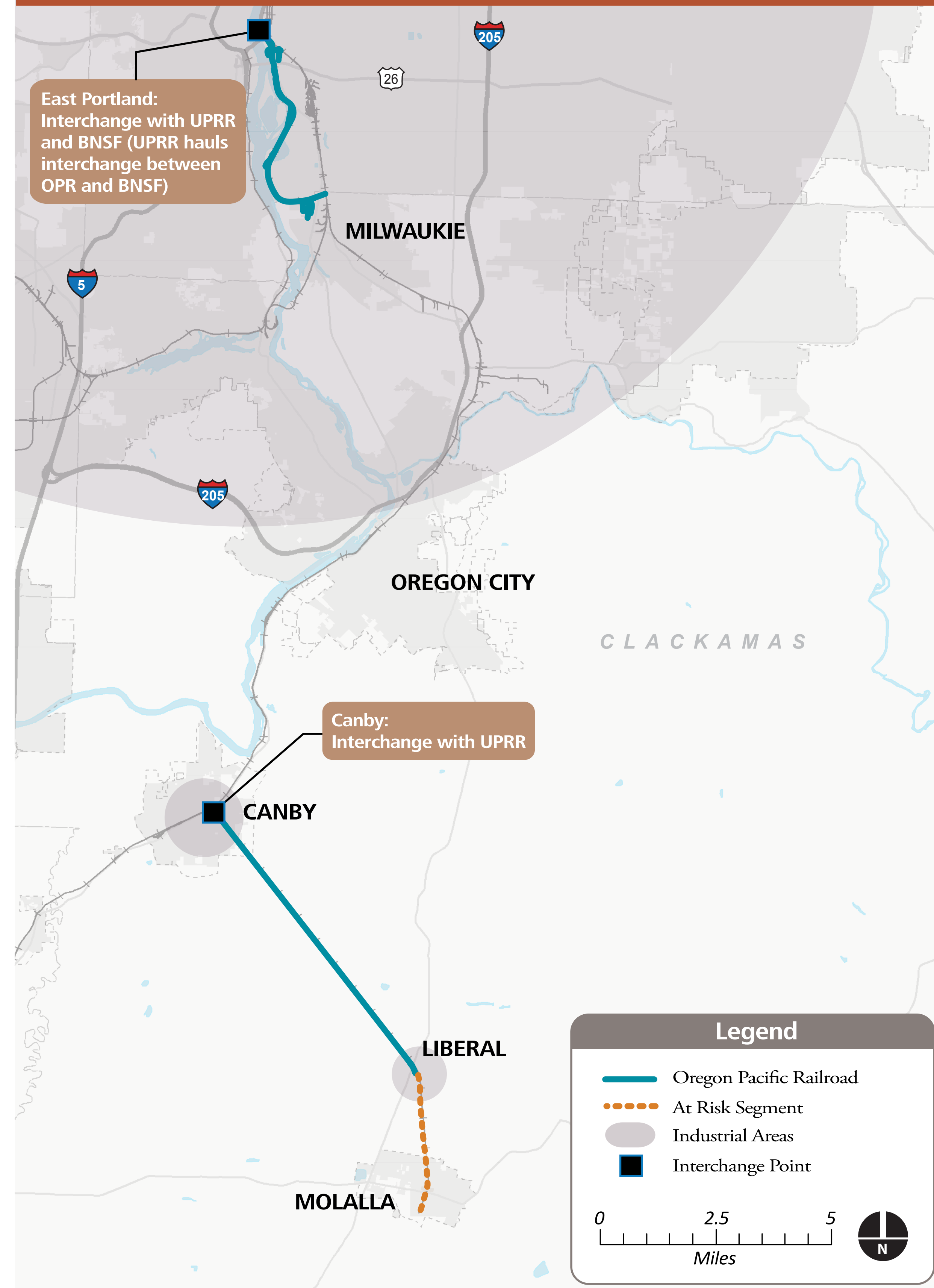
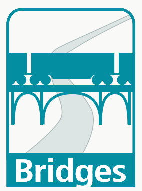


Figure 3.18A — Palouse River & Coulee City Railroad

Palouse River & Coulee City Railroad

Infrastructure

Track: 32 miles
- Class 2: 11
- Excepted: 21



Bridge Segments Studied: 5
- Good Condition: 2
- Fair Condition: 2
- Poor Condition: 1

Cost to upgrade bridges to 286K cars:
@ 10 mph: $328K
@ 25 mph: $328K

Cost to replace bridges: $8.7M

Operations

LOCAL FREIGHT SERVICE

One to two round trips between Arlington and Shutler Monday through Friday.

One round trip between Walla Walla and Weston every Wednesday.

Figure 3.18B — Palouse River & Coulee City Railroad

Figure 3.19A Peninsula Terminal Company

Peninsula Terminal Company

Infrastructure

Track: 2 miles
- Class 1: 2

Operations

LOCAL FREIGHT SERVICE

Three switchers operate 12 hours per day.

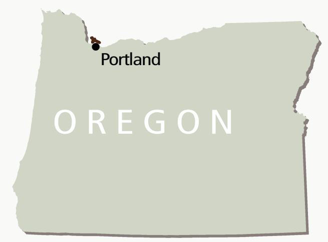


Figure 3.19B Peninsula Terminal Company

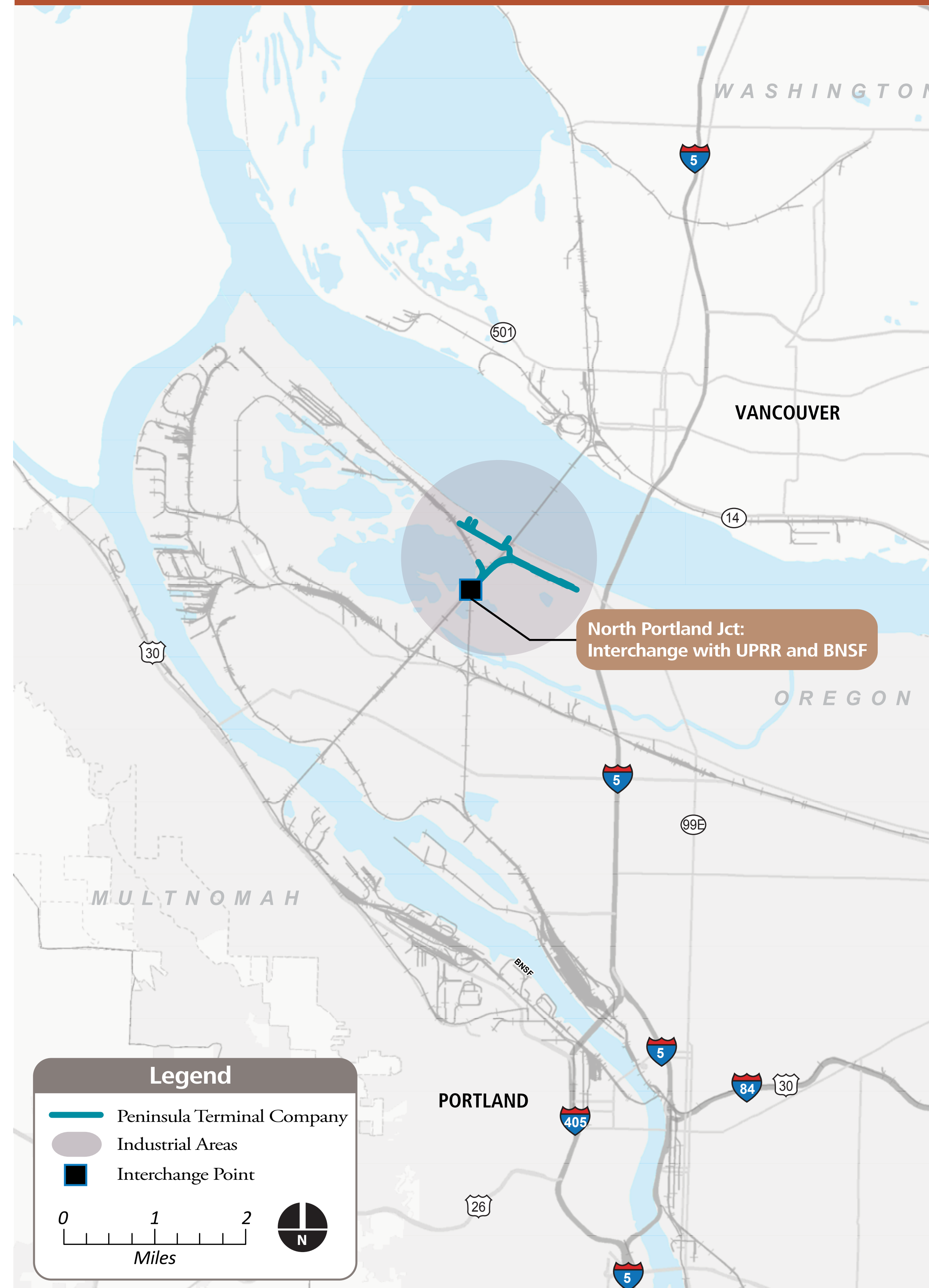


Figure 3.20A Port of Tillamook Bay Railroad

Port of Tillamook Bay Railroad

Infrastructure

Track

Track: 85 miles
- Class 1: 13
- Excepted: 25
- Not in Service: 47

Bridges

Bridges not studied

Tunnels

Tunnels: 10
(not studied)

Operations

LOCAL FREIGHT SERVICE

Switching for local industries provided by PNWR at Banks five days a week, depending on demand.

Special excursion trains between Garibaldi and Wheeler.

AT RISK CORRIDOR*

Due to severe storm damage that left most of the line inaccessible, the Port of Tillamook Bay Railroad filed a notice of Discontinuance of Service with STB between Cochran and Tillamook effective March 5, 2010. A "Discontinuance of Service" preserves the corridor and the option to resume service.

* *See Chapter 4, At Risk Corridors Section*

Figure 3.20B Port of Tillamook Bay Railroad

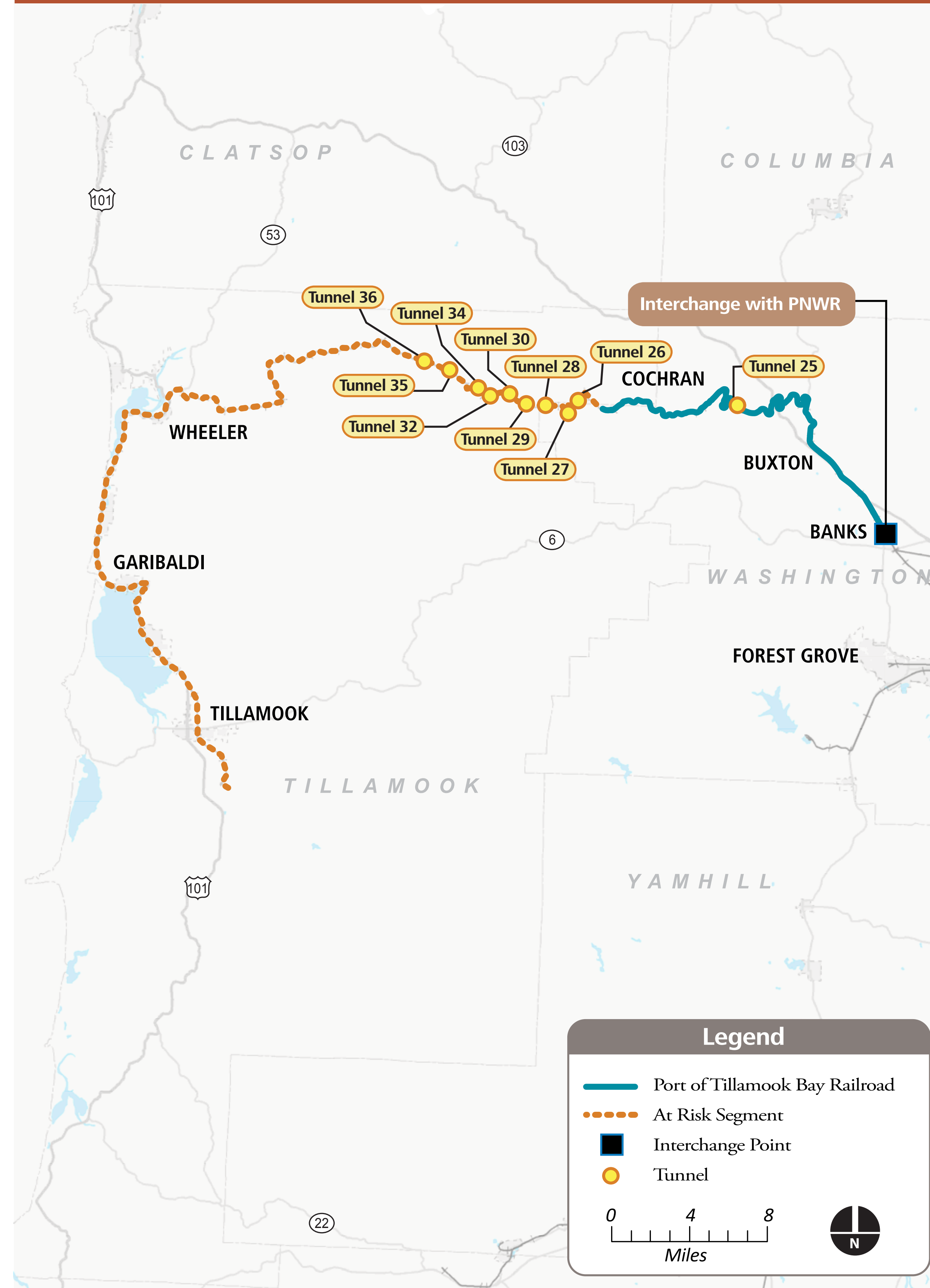


Figure 3.21A Portland & Western Railroad

Portland & Western Railroad

Infrastructure

Track

Track: 286 miles
- Class 2: 253
- Class 1: 12
- Excepted: 20

Bridges

Bridge Segments Studied: 125
- Good Condition: 44
- Fair Condition: 70
- Poor Condition: 11

Cost to upgrade to 286K cars:
@ 10 mph: $34M
@ 25 mph: $42M

Cost to replace bridges: $438M

Tunnels

Tunnels: 3

Cost to upgrade:
20-year life span: $5M
Double-stack cars: $6.3M

Operations

LOCAL FREIGHT SERVICE

One round trip daily except certain holidays between:
- Albany and Eugene
- Albany and Vancouver, WA
- Willbridge and Linnton
- Beaverton and Albany (OE) (not on weekends)
- Rainier and Portland (not on weekends)

One round trip daily as required between:
- Tigard and Portland (two to three times per week)
- Rainier and Wauna (two to three times per week)
- Seghers and Tigard
- Hopmere and Tonquin or Hillsboro
- Forest Grove District (one time per week)

AT RISK CORRIDOR*

Astoria District (Wauna to Tongue Point)
There are no active customers on this segment of the line but in 2010, repairs to a washout near Knappa will make the line operable. Port of Astoria is actively pursuing industrial development opportunities that include rail service.

Forest Grove District (Hillsboro to Forest Grove)
Line is in poor condition and low traffic volumes will not justify reinvestment.

** See Chapter 4, At Risk Corridors Section*

Figure 3.21B Portland & Western Railroad

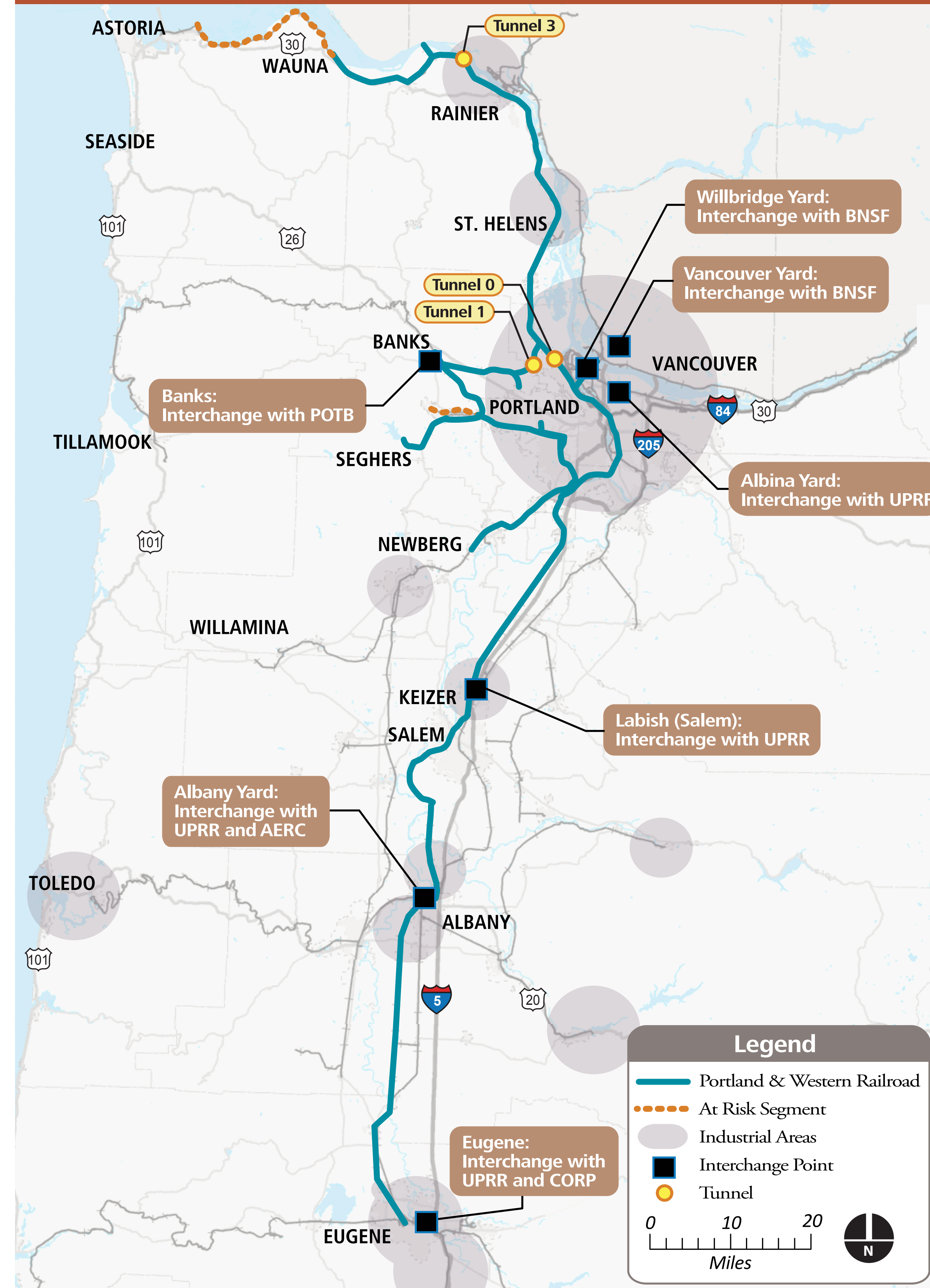


Figure 3.22A Willamette & Pacific Railroad and Hampton Railway

Willamette & Pacific Railroad

Infrastructure

Track

Track: 184 miles
- Class 2: 149
- Class 1: 7
- Excepted: 28

Bridges

Bridge Segments Studied: 158
- Good Condition: 23
- Fair Condition: 91
- Poor Condition: 44

Cost to upgrade to 286K cars:
@ 10 mph: $32M
@ 25 mph: $32M

Cost to replace bridges: $261M

Tunnels

Tunnels: 1

Cost to upgrade:
20-year life span: $800K
Double-stack cars: $800K

Operations

LOCAL FREIGHT SERVICE

One round trip daily except certain holidays between:
Albany and Eugene
Albany and Toledo
Albany and McMinnville

One round trip between McMinnville and Newberg two to three times per week.

AT RISK CORRIDOR*

Bailey District (Greenberry to Monroe and Dawson) - Already listed as a candidate for potential abandonment on the PNWR system diagram map filed with STB.

Dallas District (Gerlinger to Dallas) -The last shipper on this route, a Weyerhaeuser lumber mill, closed permanently in 2009. Line currently being used for car storage.

Hampton Railway

Infrastructure

Track

Track: 5 miles
- Excepted: 5

Bridges

Bridge Segments Studied: 3
- Fair Condition: 3

Cost to upgrade to 286K cars:
@ 10 mph: $274K
@ 25 mph: $274K

Cost to replace bridges: $2.5M

Operations

LOCAL FREIGHT SERVICE

Service as needed between Fort Hill and Willamina.

AT RISK CORRIDOR*

Line at risk due to low volumes.

See Chapter 4, At Risk Corridors Section

Figure 3.22B Willamette & Pacific Railroad and Hampton Railway

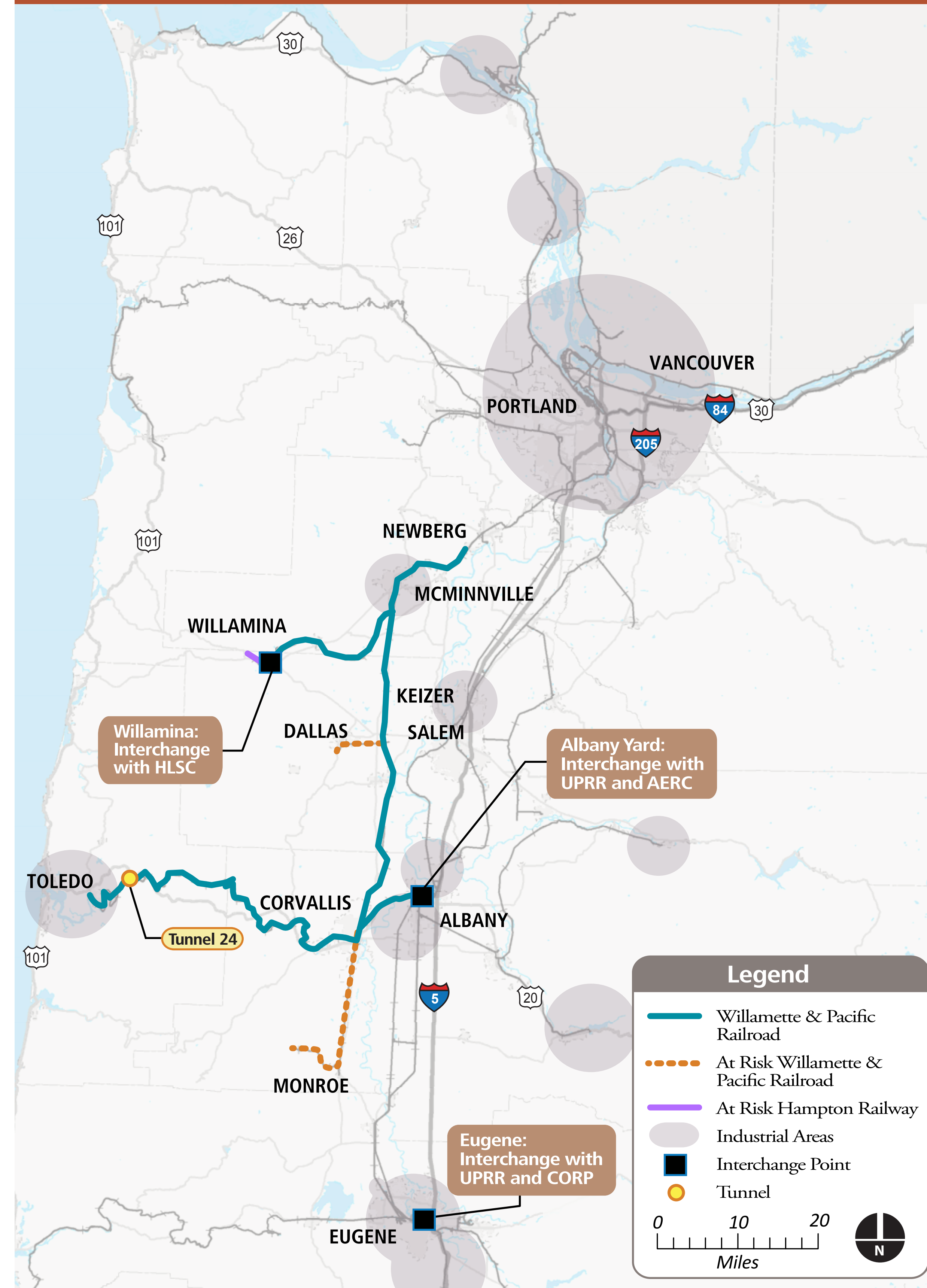


Figure 3.23A Willamette Valley Railway

Willamette Valley Railway

Infrastructure

Track

Track: 33 miles
- Excepted: 33

Bridges

Bridge Segments Studied: 9
- Good Condition: 1
- Fair Condition: 4
- Poor Condition: 4

Cost to upgrade to 286K cars:
@ 10 mph: $2.7M
@ 25 mph: $3.1M

Cost to replace bridges: $20.2M

Operations

LOCAL FREIGHT SERVICE

One round trip between Woodburn and Silverton four times per week.

One round trip between Woodburn and Stayton one time per week.

AT RISK CORRIDOR*

Entire line at risk due to low traffic volumes.

See Chapter 4, At Risk Corridors Section

Figure 3.23B Willamette Valley Railway

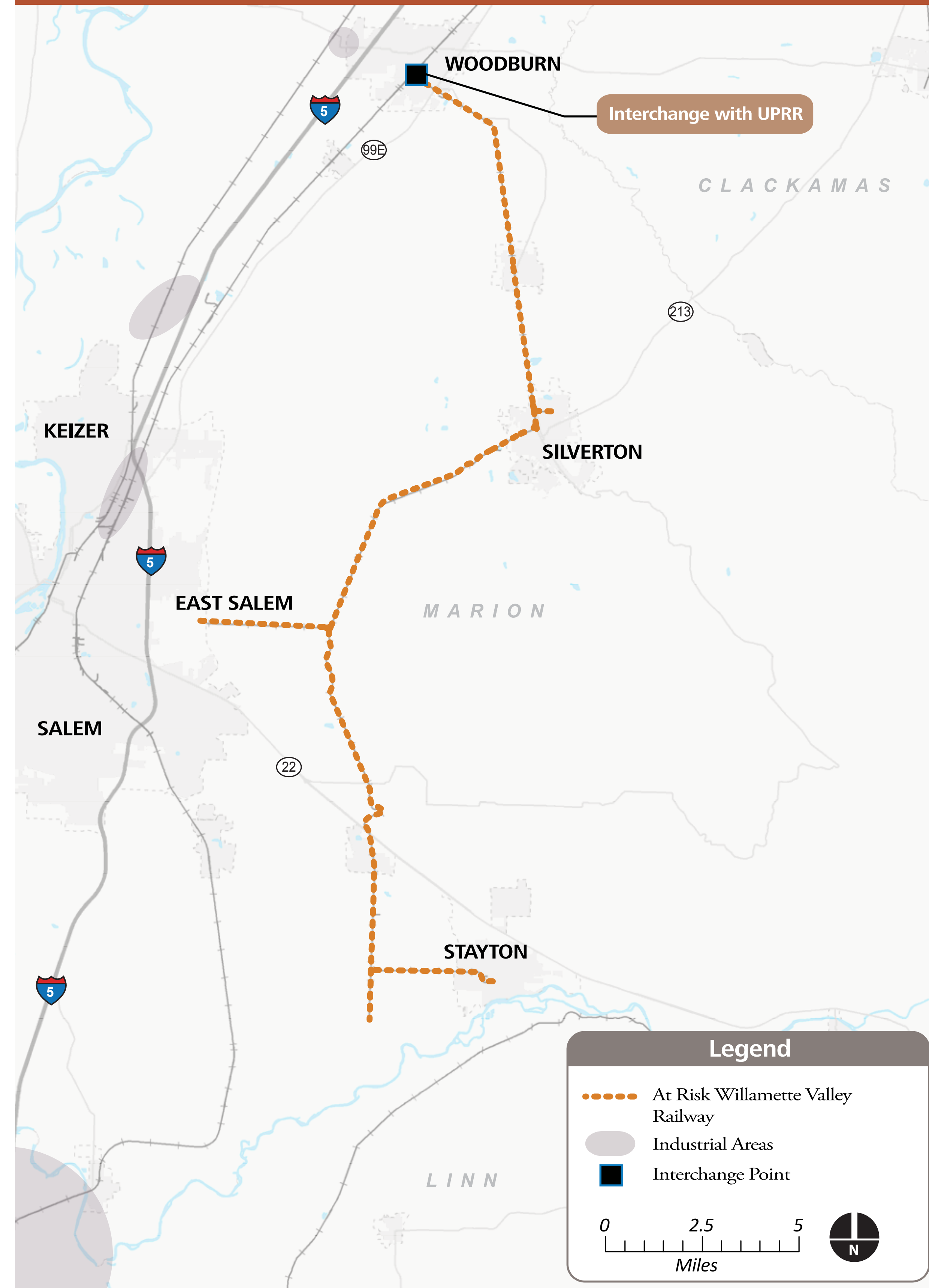


Figure 3.24A Wyoming & Colorado Railroad

Wyoming & Colorado Railroad

Infrastructure

Track

Track: 23 miles
- Excepted: 23

Bridges

Bridge Segments Studied: 2
- Fair Condition: 2

Cost to upgrade to 286K cars:
@ 10 mph: $141K
@ 25 mph: $141K

Cost to replace bridges: $8.5M

Operations

LOCAL FREIGHT SERVICE

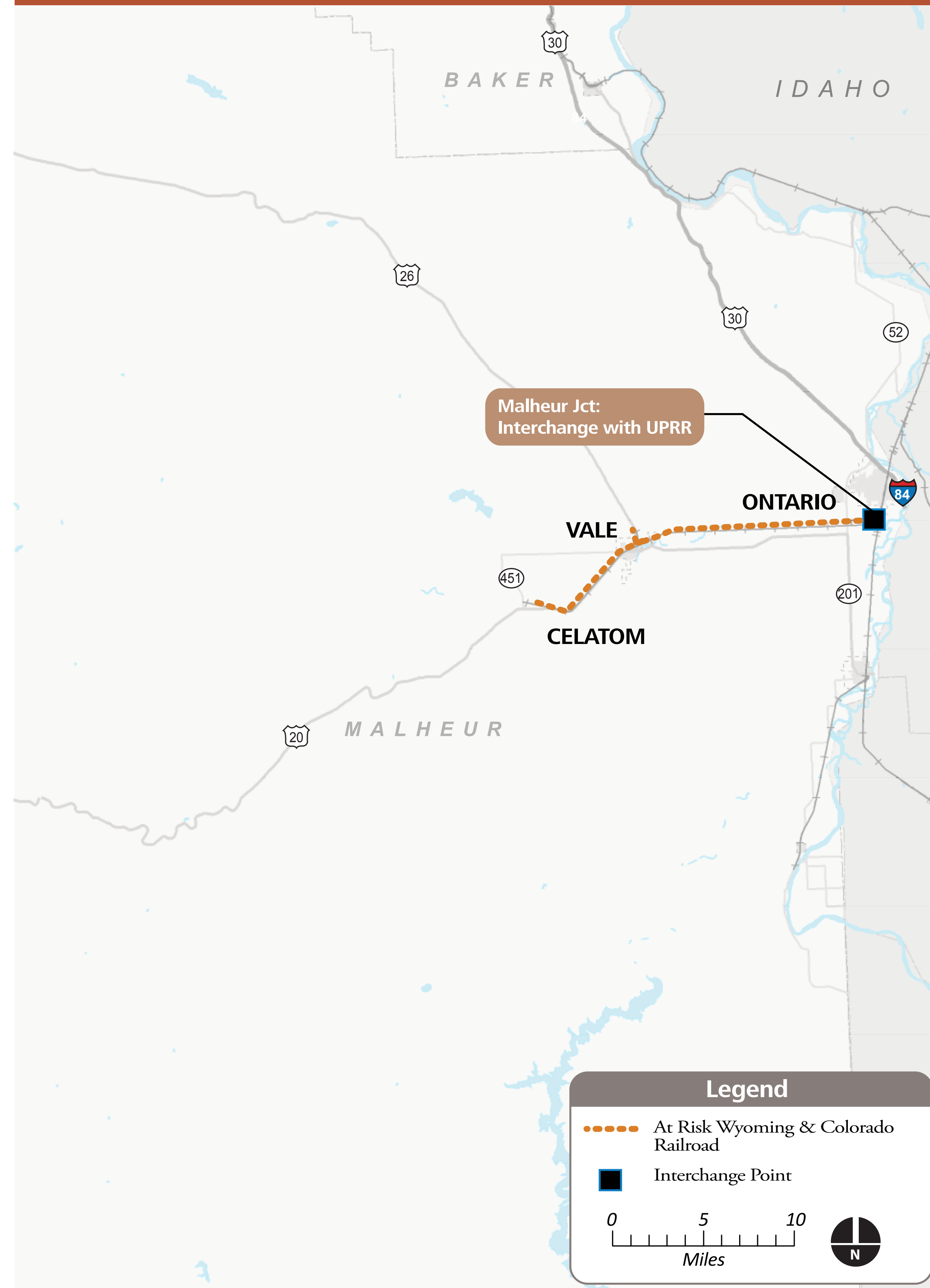
One round trip between Ontario and Celatom Monday, Wednesday and Friday.

AT RISK CORRIDOR*

Entire line at risk due to low traffic volumes.

* See Chapter 4, At Risk Corridors Section

Figure 3.24B Wyoming & Colorado Railroad



Freight Rail Industry

The previous chapter described Oregon's rail infrastructure within the context of the national rail system. The companies using that infrastructure vary greatly in size, purpose, and management structure. By the nature of the industry, the operations of those companies affect and are affected by the demand for commodities. The national scope of the industry means that the Class I railroad companies make operating, marketing, and investment decisions based on a number of factors that in turn influence Oregon's economy and the shortline railroads. To formulate successful partnerships and policies related to the railroad industry, Oregon must understand the operational and market drivers, and the challenges confronting each sector of the industry.

The first part of this chapter examines the flow of goods across the country and within the state, and how the markets may change between now and 2035. The second part of this chapter discusses freight service within the commodity flow and how the national and state railroads provide services on their networks.

The third part of this chapter builds on the inventory of conditions in Chapter 3, reviews the findings of freight rail and truck operations in Oregon from sections earlier in Chapter 4, and by coupling the two, reveals opportunities to enhance the freight economy.

National Rail Commodities, Volumes, and Transportation Corridors

Freight rail historically transports low value, high volume, heavy commodities over distances of more than 500 miles. The top five commodity groups in descending order by volume are coal, nonmetallic minerals (stone, clay, glass, concrete products), farm products, chemicals, and intermodal.[15] Intermodal shipping is a relative newcomer in the rail industry's 180-year history. Beginning in the 1970s, the development of container-based ocean shipping for consumer goods began to integrate rail and trucks into the logistics chain. Commensurate with growth in US imports over the last 30 years, the railroads have been shipping more high-value products in containers via intermodal trains.

Despite the significant growth of intermodal traffic, however, coal still dominates. Over 200 trainloads of coal leave from Wyoming's Powder River Basin and the Appalachian Mountains every day, mostly destined for power plants in the Midwest and East Coast regions. The logistics of coal trains govern much of the operational and strategic thinking for US railway managers. Coal tonnage relative to other commodities can be seen in Figure 4.1.

Intermodal rail corridors carry containerized consumer products between major population centers and ports. The busiest intermodal corridor is between California and Chicago. Containers unloaded in the huge port complex in the Los Angeles Basin are loaded onto trains bound for Chicago and destinations beyond on the East Coast. The intermodal trains often have priority over other trains on the system (referred to as "expedited") to ensure delivery schedules. National trucking lines and parcel delivery services are large customers of intermodal rail services.

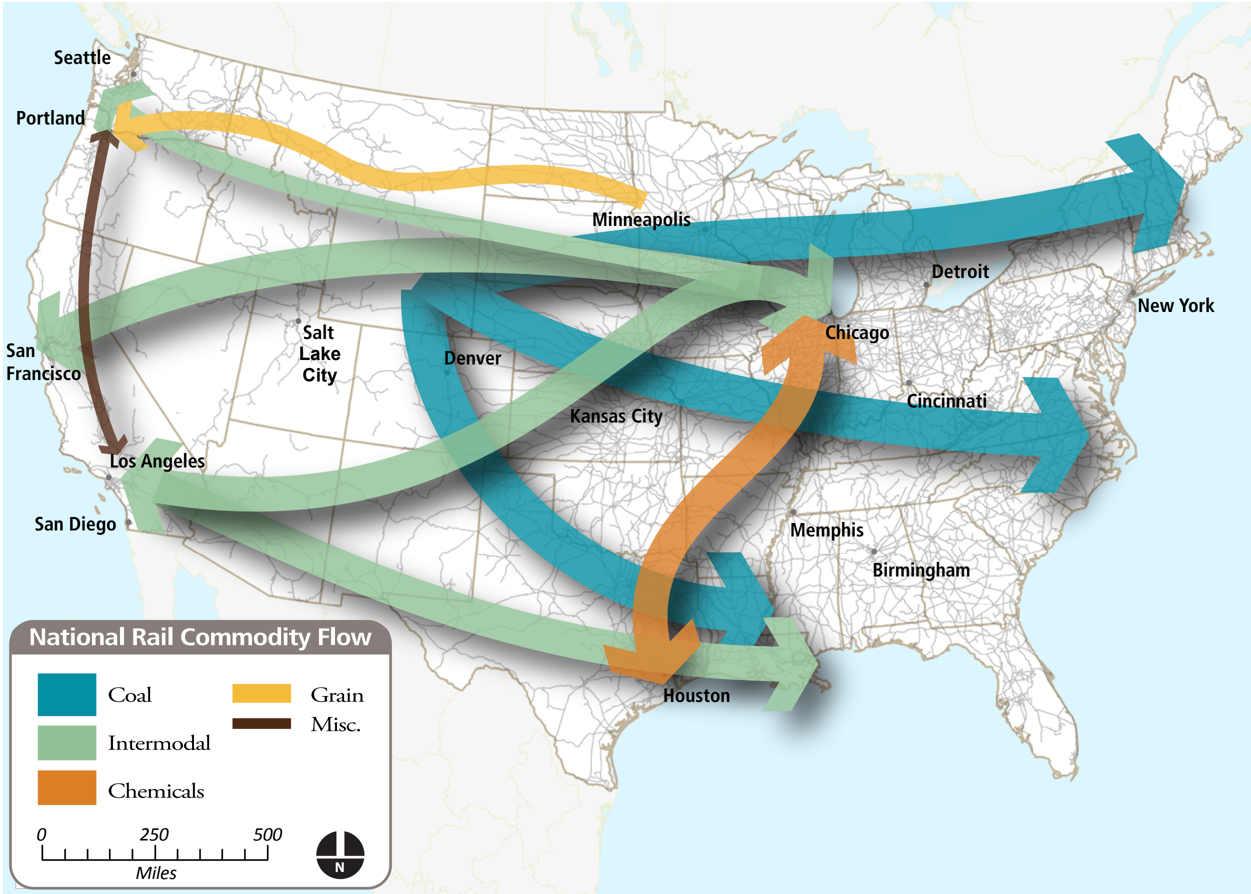
15 Intermodal is a term used to describe transporting freight in containers or truck trailers, using multiple modes of transportation (rail, ship, and truck), without any handling of the freight itself when changing modes.

Chemical products for manufacturing form the third-largest, and highly profitable, commodity flow for the railroads. Chemical transport occurs primarily between Houston and Chicago.

Major grain shipments comprise wheat, corn, and soybeans for domestic and foreign markets. Originating in all growing regions, but predominantly the Midwest, large quantities of grain are transported to feed lots and population centers where the milling and manufacturing occur. The main grain export locations are on the Columbia River, in Puget Sound, and on the Gulf Coast, particularly along the lower part of the Mississippi River.

Non-metallic minerals transported by rail include sand, gravel, and rock carried regionally for the construction industry, and soda ash mined in Wyoming and southern California and used for filtration systems and in glass manufacturing. Potash, an ingredient in fertilizer that is mined in Saskatchewan, is shipped to export facilities in the Pacific Northwest.

Figure 4.1 High-Density Rail Corridors by Commodity Flow



LOGISTICAL ISSUES OF NATIONAL RAIL SHIPMENTS

The commodity flows shown in Figure 4.1 affect other rail movements or business lines that run counter to the direction of major flows or at significantly different operating speeds. For example, rail shipment of wind energy components recently emerged as a need in western states. In order to ensure reliable service of trains carrying wind turbine parts, the railroads would quote rates only for routes where wind equipment would not interfere with the dominant coal, intermodal, agricultural, and chemical trains.

Recent trends suggest that the growing use of Atlantic, Gulf Coast, and foreign shipping facilities may diminish the West Coast's dominance in the import container sector. The trend is likely to be intensified by the opening of an enlarged Panama Canal in 2014. The widened canal will eliminate a major bottleneck and permit larger vessels to directly connect Asian ports with the US East Coast and Gulf Coast ports.

Oregon Commodity Flows—All Transportation Modes

As part of planning for the development of Oregon's first multimodal, statewide freight plan as a component of the *OTP*, ODOT commissioned an update to the statewide *Oregon Commodity Flow Forecast* (*CFF*), Appendix E. The resulting update addressed the limitations of existing forecasts—inconsistent and separate databases for different modes, lack of transparency in data and assumptions, and data gaps—in a consistent methodology based on national and local data sources. The *Oregon CFF* is a county-level *CFF* in tons and vehicles (where applicable) for truck, rail, marine, air, and pipeline modes from 2002 to 2035. For the purpose of the *CFF*, goods were classified into categories and the state divided into the Portland Area (comprising Multnomah, Washington, Clackamas, and Yamhill counties) and Oregon Remainder (Oregon outside of the four counties). The new *CFF* will be used to uncover opportunities for Oregon to optimize commodity flow over the entire transportation network.

DIRECTION AND TRENDS OF COMMODITY FLOWS

More goods (measured in tons) are shipped within Oregon than arrive from, or are shipped to, destinations outside Oregon. The graph in Figure 4.2 shows that inbound flows will grow (1.3 percent annually) by 2035 but decline slightly in their share of the flow of goods. Outbound flows will grow the fastest (2.8 percent annually) but will still lag behind internal flows in terms of share of freight movements. By 2035, internal freight movements by all modes will still dominate in terms of overall tonnage.

When the projected Oregon commodity tonnage is disaggregated by Oregon region (excluding pipeline flows), the results reveal that growth rates have been and are expected to be relatively consistent. Portland tonnage is projected to grow at the highest rate (2.2 percent annually) and non-Portland Oregon tonnage is projected to grow slightly faster (1.6 percent annually) than the state population growth rate of 1.3 percent.[16] Figure 4.3 predicts that commodity flow will remain the greatest within and through Portland, followed by the Willamette Valley and Central Oregon.

16 For context, Oregon's Office of Economic Analysis (OEA) forecasts annual employment (June 2009) and population (2004) growth from 2003 to 2035 at 3.2 percent and 1.3 percent, respectively.

Figure 4.2 Direction of Commodity Flows by Tons and Percent Share, 2002-2035

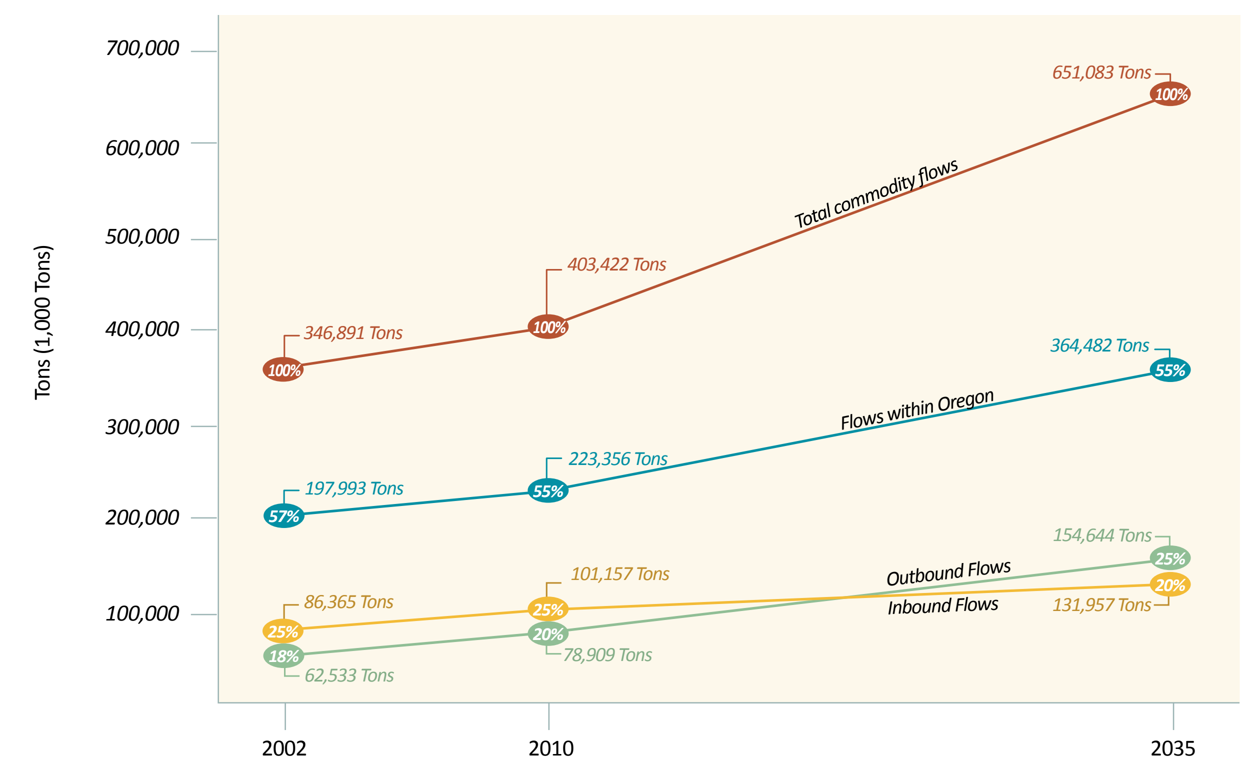
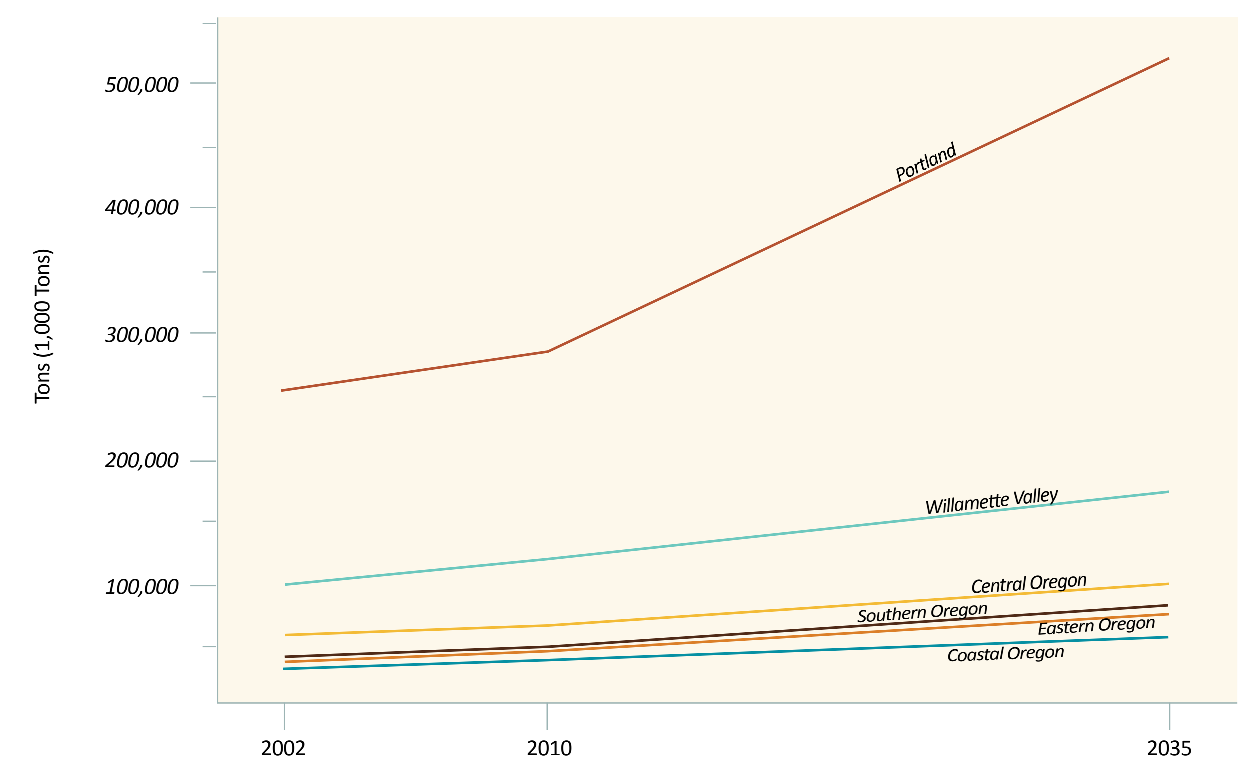


Figure 4.3 Oregon Commodity Flow Tonnage by Region, 2002-2035 (in Thousands of Tons)



2002-2035 OREGON COMMODITY FLOW BY MODE

Data for all the modes and years was compiled into a master database and then summarized by mode and across modes to study overall trends in freight. Truck flows dominate, with a share of roughly 72 to 78 percent. The relative share of shipping by each mode did not change from 2002 to 2010 and is not forecasted to change by 2035. The compound average growth rate of all Oregon freight averages 1.9 percent annually in tonnage, but goods are becoming more valuable, showing a three percent growth in value over the same period.

TOP COMMODITIES BY WEIGHT AND VALUE, 2002 AND 2035

Tables 4.1 provides information on the commodities shipped to or from Oregon (therefore excluding through-shipments), showing actual tonnage shipped and values in 2002 and the projected weights and values for 2035. The top commodity by weight in 2002 was clay/concrete/stone/glass, about a quarter of all shipped weight. Farm products was the next heaviest commodity shipped, followed by petroleum or coal products, and logs/lumber/wood products. The top five categories by weight equal about 66 percent of the total weight of goods shipped in 2002 but will fall about 10 percent to 56 percent by 2035, indicating a trend towards diversification by weights shipped. The top three categories are expected to keep their position over time.

Forest products[17] are predicted to drop from fifth in 2002 to 10th by 2035. The swiftly growing waste/scrap category (10th in 2002 and fourth in 2035) is expected to surpass the logs/lumber/wood products category (fourth in 2002 and sixth in 2035).

Higher tonnage does not necessarily equate to a high value share of all goods shipped. The highest values in 2002 belonged to the category of miscellaneous freight, followed by electrical equipment, and machinery. The top three slightly change their relative positions between 2002 and 2035, but remain the top three in 2035.

Only four categories are expected to experience a decline in value between 2002 and 2035. Of these, apparel is the only category in the top ten value categories. The fastest-growing categories will be instruments/photo/optical, ordnance or accessories (military weapons), miscellaneous manufacturing products, and machinery.

Notably rapid growth in categories does not necessarily equate to equivalent value for the Oregon economy. For example, tons of "waste/scrap" materials are predicted to grow by 3.7 percent annually between 2002 and 2035, and its value is expected to grow 31 percent between 2002 and 2035; however, the value share represented by waste/scrap materials in 2035 is only two percent of total value. Ordnance and accessories will grow in weight by 4.9 percent annually between 2002 and 2035, but it will be less than one percent of the total value of goods shipped. A notable category is "machinery." Its annual growth rate of 4.4 percent to 2035 (fourth-highest) will represent nearly 16 percent of the value of shipped goods, up from 10 percent in 2002.

17 Forest products are trees, seeds, and sap, whereas logs/lumber/wood products are items like plywood and chips.

Table 4.1 2002-2035 Oregon Tonnage by Commodity (1000 tons, all modes)

Commodity (STCC)	Tonnage (1000 tons)			Annual Growth Rate 2002-2035	Value ($M in 2002$)			Share of Total Value in 2035
	2002	2010	2035		2002	2010	2035	
Farm products	48,301	58,375	88,932	1.9%	$11,310	$13,941	$21,132	3.70%
Forest products	18,033	16,470	16,888	-0.2%	$780	$713	$733	0.13%
Fresh fish	347	414	745	2.3%	$1,617	$1,931	$3,476	0.61%
Metallic ores	492	619	579	0.5%	$484	$648	$563	0.10%
Coal	15,458	14,771	30,131	2.0%	$2,813	$2,671	$5,628	0.99%
Petroleum, natural gas	5,017	5,074	8,767	1.7%	$5,765	$5,352	$8,007	1.40%
Nonmetallic minerals	3,745	4,823	7,468	2.1%	$279	$362	$564	0.10%
Ordnance or accessories	281	335	1,365	4.9%	$146	$174	$711	0.12%
Food and kindred products	17,810	20,522	38,411	2.4%	$15,731	$18,345	$34,769	6.09%
Tobacco products	486	553	1,202	2.8%	$882	$1,004	$2,182	0.38%
Textile mill products	299	257	235	-0.7%	$5,617	$4,913	$4,544	0.80%
Apparel & related products	173	151	149	-0.5%	$9,985	$8,563	$7,954	1.39%
Logs, lumber, wood products	30,816	31,014	40,145	0.8%	$12,399	$12,445	$15,972	2.80%
Furniture or fixtures	595	677	1,375	2.6%	$1,444	$1,635	$3,223	0.56%
Pulp, paper, allied products	6,603	7,150	10,325	1.4%	$5,737	$6,182	$8,822	1.55%
Printed matter	1,236	1,310	1,657	0.9%	$2,849	$3,022	$3,821	0.67%
Chemicals, allied products	17,354	21,721	38,210	2.4%	$13,918	$17,291	$34,775	6.09%
Petroleum or coal products	32,361	34,500	54,487	1.6%	$9,298	$10,013	$16,616	2.91%
Rubber or misc plastics	1,857	2,465	5,579	3.4%	$4,928	$6,530	$14,765	2.59%
Leather or leather products	114	97	88	-0.8%	$702	$596	$536	0.09%
Clay, concrete, glass, stone	100,463	128,072	168,924	1.6%	$3,458	$4,342	$5,929	1.04%
Primary metal products	4,602	5,502	7,792	1.6%	$4,330	$5,099	$7,457	1.31%
Fabricated metal products	3,603	4,664	9,646	3.0%	$10,019	$12,986	$27,165	4.76%
Machinery	2,772	4,241	11,444	4.4%	$21,681	$33,017	$89,096	15.61%
Electrical equipment	678	841	2,277	3.7%	$24,215	$30,855	$90,827	15.92%
Transportation equipment	3,310	3,858	9,904	3.4%	$14,470	$17,596	$45,228	7.93%
Instrum, photo/optical equipment	104	111	623	5.6%	$2,154	$2,530	$13,905	2.44%
Misc products of manufacturing	1,060	1,281	4,713	4.6%	$4,084	$4,933	$17,868	3.13%
Waste/scrap	13,731	16,139	45,218	3.7%	$1,747	$2,083	$5,638	0.99%
Misc freight	14,582	16,651	42,832	3.3%	$25,216	$28,460	$77,967	13.66%
Shipping Containers (rail)	403	508	647	1.4%	$315	$397	$506	0.09%
Mail	207	257	328	1.4%	$162	$201	$257	0.05%
TOTAL	346,892	403,423	651,083	1.9%	$218,536	$258,829	$570,635	

Notes: Some rail waybill-only commodities combined with related categories, as noted.
Excludes tonnage traveling through Oregon without an Oregon origin or destination.
Growth Rate = Compound annual growth rate 2002-2035.

OREGON RAIL AND TRUCK SHIPPING SECTORS

The *CFF* quantifies tonnage volumes and commodities in parallel rail and truck corridors and categorizes Oregon rail flow data into eleven rail corridors, as shown in Figure 4.4.[18] Summarizing the data this way quickly illustrates the relative importance of the different rail corridors in the state.

Trucking dominates shorter freight movements while rail shipping is almost entirely long-haul and through, rather than within, Oregon. Surprisingly, the top commodities carried by trucks are heavy and low-value commodities (similar to rail commodities) when typically lighter and higher-value products are associated with truck shipments. The Portland region, a hub for both trucking and train movements, has the highest density for both modes.

Intermodal hubs provide the transfer point for containers or truck trailers between trains and trucks. There are no intermodal hubs south of Portland, which means that this mode is less economically viable the further away the freight is from Portland. Mixed merchandise is projected to grow at a relatively rapid pace, and this is the commodity group most often associated with intermodal transport.

Looking at which truck and rail corridors are either most- or under-used reveals where large flows of trucked commodities operate parallel to rail lines. This analysis adds to the state's and industry's knowledge about potential opportunities for shortline railroads to attract greater volumes of, and more diverse, cargoes. This analysis is discussed more fully later in this chapter, under Rail Growth Opportunities.

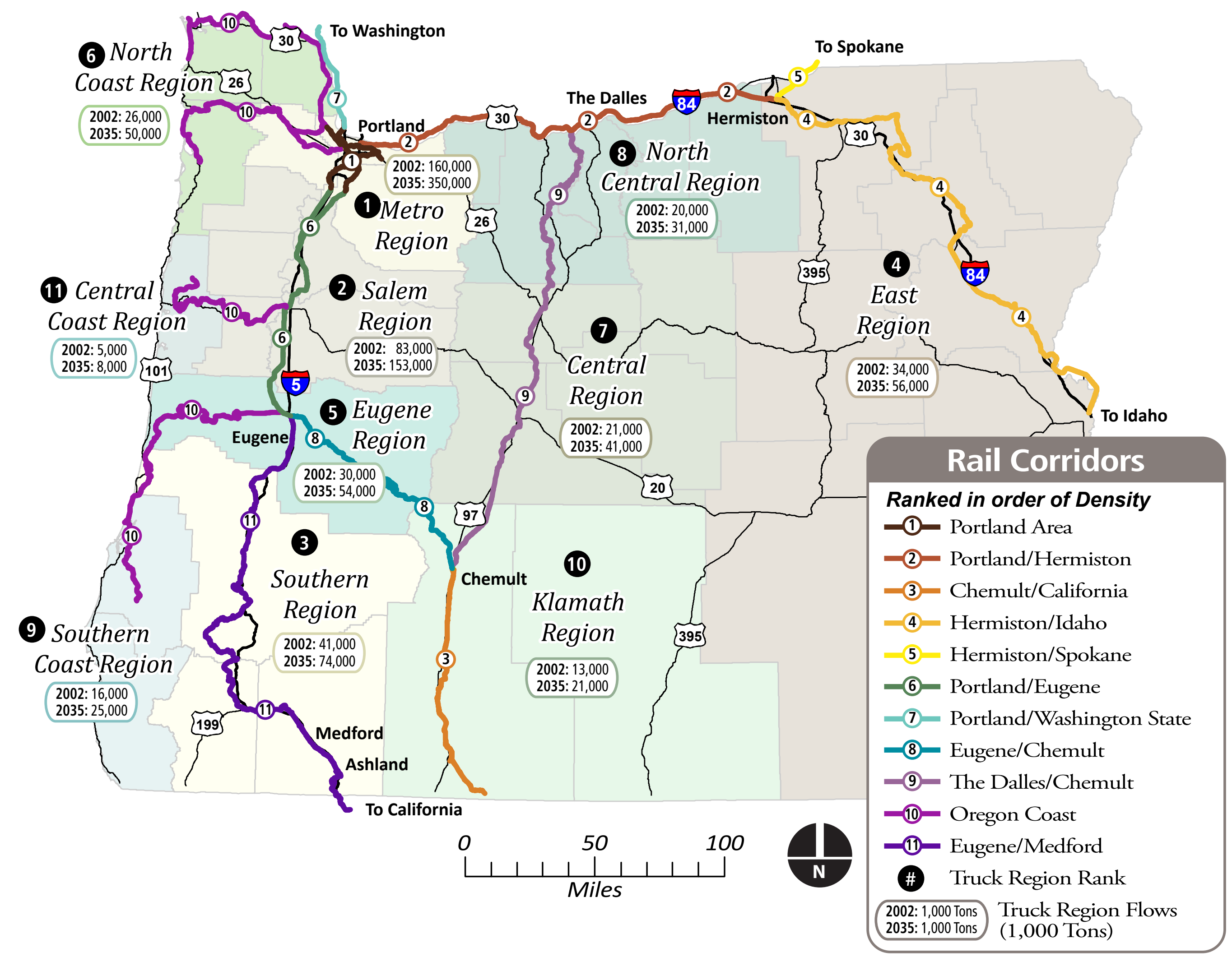
RAIL CORRIDORS

Compared to the national market, Oregon is not a major player in terms of track mileage or traffic volume. In 2007, Oregon ranked 39th among states for rail tonnage carried; this includes originating, terminating, and through traffic.[19]

The Portland area is densest in terms of rail activity and serves as the hub of most rail operations in the state. The east-west Portland/Hermiston corridor along the Columbia River Gorge is the next densest rail corridor in Oregon. This corridor links the rail hubs in Portland and the Port of Portland to markets in the upper Midwest. BNSF and UPRR move minerals, grain, and automobiles on their high-capacity Columbia River routes between the Pacific Northwest and the upper Midwest. The rail share of total freight transported in the I-5 corridor between Portland and the California and Southwest markets is relatively modest considering the distances involved, and this north-south corridor has more capacity compared to the east-west route. Shortline railroads handle approximately 15 percent of the freight rail volumes, most of which is in the I-5 corridor.

18 Regions are aggregations of one or more counties.
19 *State Rankings*, Association of American Railroads, 2007.

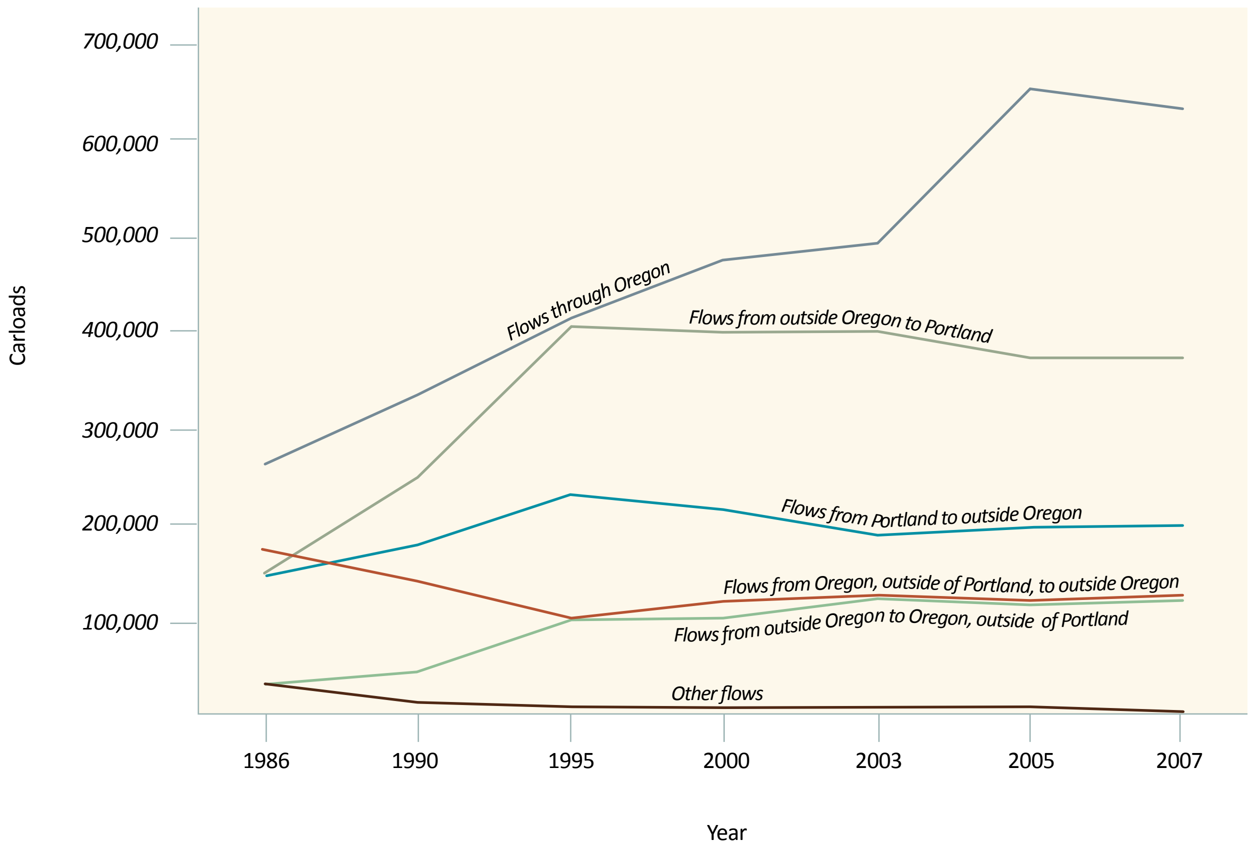
Figure 4.4 Truck Flow Regions (Tons Shipped), Rail Corridors (Listed in Order of Density), and Highways in Oregon



The greatest volume of rail shipments originates and ends outside of Oregon; in other words, these are through-freight flows (see Figure 4.5). This statistic contrasts with data for shipments by all modes, where most shipments originate and end inside Oregon. The next largest flow of commodities by rail originates outside of Oregon and ends in Portland. The third largest flow originates in Portland and ends outside the state. Over time, this pattern is predicted to stay the same.

The growth in volume (carloads) of rail shipments was steady between 1986 and 2007 (see Figure 4.5 and 4.6). Volume rose for those two decades except during two periods, 2000 to 2003 and 2005 to 2007.

Figure 4.5 Direction of Carloads (1986 to 2007)



COMMODITIES SHIPPED BY RAIL

As shown in Tables 4.2 and 4.3, the dominant goods moved by rail in 1986 and 2007 in Oregon were lumber, farm products, chemicals, pulp, and food products, making up about 65 percent of all rail tonnage in Oregon. Approximately 25 percent of all rail tonnage is lumber or wood products. Lumber or wood products and farm products ranked first and second in 1986 and 2007, but their combined share of the total rail tonnage has declined from 53 percent to 37 percent during that same time period. Likewise, pulp and paper products were 12 percent of rail shipments in 1986 but by 2007 amounted to only seven percent. Chemicals or allied products rose from sixth place in 1986 to third place in 2007, while their share of the total rose from five percent to 12 percent. Miscellaneous mixed shipments generally held steady at fifth or fourth place, but their share of the total rose from six to nine percent. All other commodities outside of the top ten combined have a very small share of the total from seven percent in 1986 to nine percent in 2007.

All commodities shipped by rail in Oregon are expected to grow over time, except for forest products, which is expected to decline by approximately nine percent between 2002 to 2035. Oregon sees almost no international intermodal moves because of the small market share in international intermodal at Port of Portland. However, Portland is the regional hub for domestic intermodal moves, which results in the operation of regularly expedited scheduled train service between Portland and Chicago. See Appendix D for more details.

Figure 4.6 Carloads by Corridor (1986 to 2007)

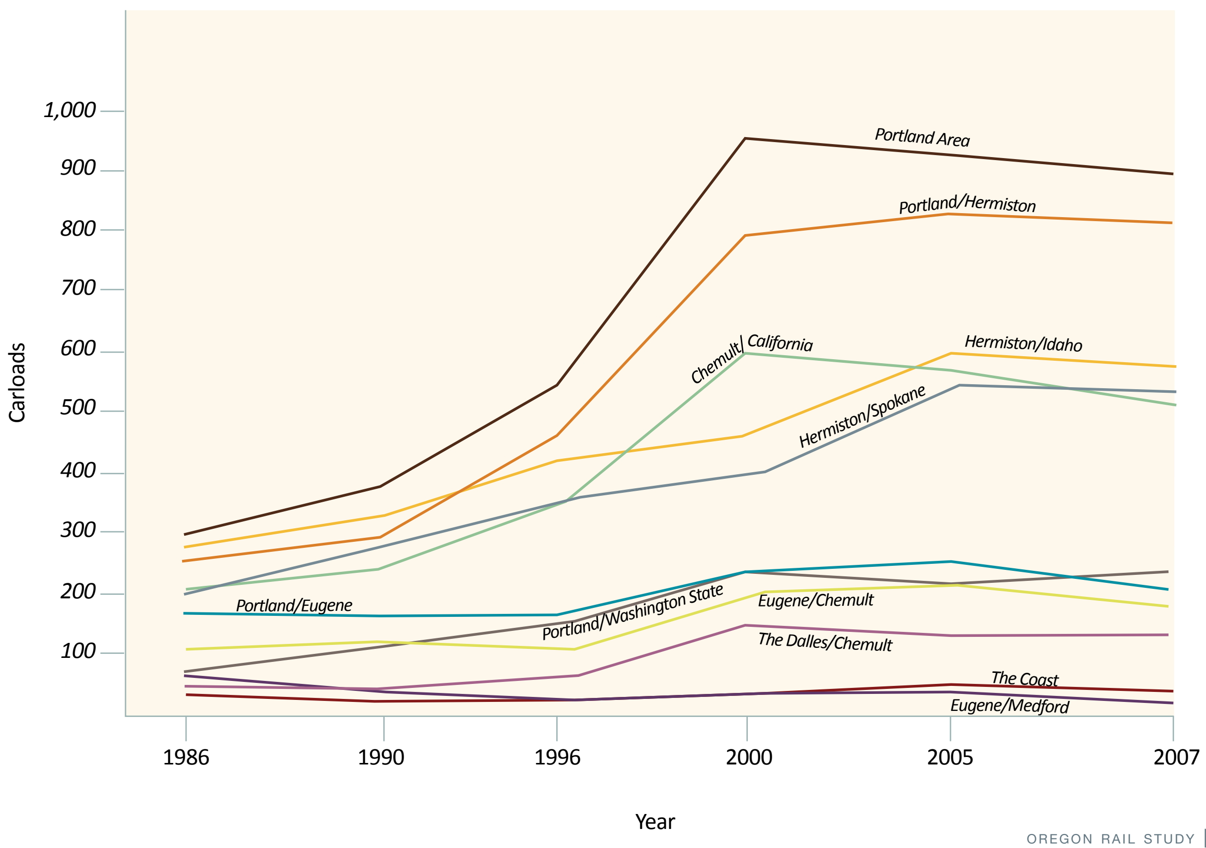


Table 4.2 Top 10 Commodities in 1986 shipped by Rail in Oregon

Commodity	Carloads	Tons	Percent of Total
Lumber or wood products, excluding furniture	221,696	14,173,244	34%
Farm products	90,126	7,944,245	19%
Pulp, paper, or allied products	92,968	5,012,780	12%
Food and kindred products	48,620	2,602,176	6%
Miscellaneous mixed shipments	142,152	2,368,847	6%
Chemicals or allied products	26,215	2,234,236	5%
Other Waste	31,588	1,682,376	4%
Primary metal products	18,016	1,299,128	3%
Transportation equipment	42,567	1,023,538	2%
Clay, concrete, glass, or stone products	11,324	856,600	2%

Table 4.3 Top 10 Commodities in 2007 Shipped by Rail in Oregon

Commodity	Carloads	Tons	Percent of Total by Tons
Lumber or wood products, excluding furniture	164,584	14,834,680	21%
Farm products	117,364	11,585,759	16%
Chemicals or allied products	86,799	8,796,844	12%
Miscellaneous mixed shipments	422,160	6,094,480	9%
Food and kindred products	75,312	5,194,272	7%
Other waste	79,228	4,852,647	7%
Pulp, paper, or allied products	74,368	4,734,580	7%
Waste or scrap materials	73,756	2,991,152	4%
Clay, concrete, glass, or stone products	30,096	2,873,784	4%
Coal	23,459	2,791,287	4%

COMMODITIES SHIPPED BY TRUCK

To analyze the flow of commodities by truck, the state was divided into regions for origin and destination of trucked goods (Figure 4.4). The densest truck corridor in Oregon is along I-5 and, as opposed to the case for the rail shipment of commodities, 75 percent of truck movements are intra-Oregon, meaning they originate in and are destined for points within the state. The Portland Region has the largest truck volumes of any region and most of the volume is intra-region.

The volume of trucked goods for each region are shown for 2002 and 2035 in Figure 4.4. Trucks carried 226 million tons of commodities in Oregon in 2002. Of the 226 million tons, 85 percent stayed within Oregon, and the remainder was trucked outside of Oregon, mainly to Washington and California. The outbound truck flow is forecasted to grow (3.6 percent per year) by 2035, while inbound and internal flows are predicted to grow more slowly, 1.3 percent and 1.8 percent per year, respectively. The growth in outbound truck shipments reflects growth in the production and demand for the major trucked commodities of farm and food products, rubber/plastics, clay/concrete/glass/stone, fabricated metals, transportation equipment, waste/scrap, and miscellaneous.

Clay/concrete/glass/stone products are the dominant commodity group in terms of weight, and that group will likely retain that position.

Freight Operations of the National Railroads

The market environment in which the Class I railroads operate and how they respond to it must be understood, because their actions affect the roles and behaviors of Oregon's railroad companies, which affects the business in Oregon. BNSF and UPRR compete head-to-head in certain service areas and also enjoy geographic dominance in certain parts of their networks. Some of the division of these major markets is driven by geography, but market shares are also strongly affected by strategic decisions made by BNSF and UPRR. As is the case with any publicly traded company, railroads make decisions designed to maximize returns for shareholders. Union Pacific Corporation is traded on the New York Stock Exchange under the ticker symbol "UNP." In autumn 2009, remaining outstanding public shares in BNSF were purchased by Berkshire Hathaway, Inc., a private company. It is too early to determine what, if any, effect this acquisition will have on the railroad's operating model. There has been no announced plan to change railroad management.

MARKETS AND SERVICE

Figure 4.7 compares the total market shares of the Class I railroads in Oregon and Washington. In both states, BNSF has a bigger share of the intermodal market, while UPRR enjoys more of the automobile and manifest/carload[20] markets, which include industrial products such as lumber and metals. Both railroads move wheat, corn, and soybeans to export elevators on the Columbia River, and market shares depend mainly on the rail line's origin. UPRR also has the predominant share of bulk mineral movements through the Port of Portland.

The railroads keep a close eye on capacity in certain corridors and adjust pricing to allocate available space to the traffic with the highest profit margin. Wheat shippers in Montana, for example, are captive to BNSF and have historically paid higher rates to West Coast port facilities compared with shippers of similar commodities from North Dakota and Minnesota, where Class I competition exists. Such "differential pricing" is defended by the rail industry as essential to maintain the profits and the return on investment necessary for capacity improvements. Deregulation of the railroads in the 1980s permitted differential pricing where previously no such contracts were permitted—a change that is credited with bringing the Class I railroads out of bankruptcy.

Both railroads primarily focus on their high-capacity east-west corridors along the Columbia River, but there is also north-south traffic. BNSF's north-south line through central Oregon is predominantly used to reposition equipment for other markets and for movement of manifest trains from Washington and Canada to the Southwest. Some

20 Manifest trains are scheduled merchandise freight trains; merchandise trains are any freight trains transporting freight other than bulk commodities. A carload train is one that has shipments of not less than five tons of one commodity.

local switching at industries located between Madras and Bend occurs on the Oregon Trunk line, but volumes and service have been declining. The UPRR route in the Willamette Valley is more heavily trafficked than the Oregon Trunk, but much of that is through traffic. Although there are some Oregon products shipped to California and the Southwest, UPRR typically does not aggressively market this corridor. As a result, a significant amount of freight, mainly wood products, moves from Oregon to northern California by truck, because rail rates are not competitive.

A continuing frustration for many rail shippers is the lack of competitive access to more than one railroad. This lack of access to the "other guy" is due to agreements reached between the Class I carriers and shortlines during sale or lease of a branch line. These are sometimes referred to as "paper barriers." These agreements almost always limit the shortline traffic to interchange only with the previous Class I owner. This allows the Class I to protect its investment in the line and sell or lease the line at lower than market value to a shortline that likely can not afford market prices. However, such obstacles are not always applicable to new traffic as they can be bypassed in certain circumstances through the Railroad Industry Agreement signed by both the Class I and shortline railroads.

A few locations in Oregon provide shippers commercial and physical access to both Class I carriers. They include, for example, a 12-mile segment of the AERC between Albany and Lebanon; the 18-mile COP; and some sites in Klamath Falls. These unique locations provide the opportunity for competitive access to two railroads as opposed to one carrier. This competitive environment can result in more favorable pricing for shippers and widen potential sales territories.

PERFORMANCE

Railroad companies track their operations using performance indicators. Examples of such indicators are:

- Mainline velocity – average speed of trains on the mainlines
- Asset utilization – cycle times of cars and locomotives
- Productivity – efficiency of crews and maintenance-of-way workers, fuel efficiency
- Service performance – safety and schedule performance

MAINLINE VELOCITY

Rail velocity refers to the average speed of trains on the mainlines, and it provides one way to track trends in delays, and conversely, smoothly running operations. Improving rail velocity entails making better use of equipment and facilities to create more fluid movements and greater efficiencies. The more time that a given piece of equipment is moving on the rails, the higher the average speed for that car and the more revenue it can generate.

Figure 4.7 BNSF and UPRR System and Market Share in Oregon and Washington

ASSET UTILIZATION AND PRODUCTIVITY: UNIT TRAIN OPERATIONS

At rail yards, crews move cars and locomotives within the yard and provide freight rail service to nearby industries. To improve productivity in these maneuvers, in recent years the railroads have preferred to use "unit trains." The unit train typically consists of 100 cars or more and is loaded at a single origin and unloaded at a single destination, thus bypassing rail yards. Grain, coal, automobile, and intermodal trains move primarily as unit trains. When coal and grain trains are emptied, they usually return to their point of origin as unit trains. Unit train operation maximizes use of locomotive power, increases active use of rail cars by eliminating time spent at switching yards, and minimizes the crews' handling of individual rail cars. There are now pricing incentives for shippers to move commodities as unit trains.

Few places in Oregon can send and/or receive unit trains because of the additional infrastructure required to hold, load and/or unload the train. The equipment needed to load and/or unload these trains is specific based on commodity types. Table 4.4 lists the locations in Oregon equipped to hold, send and/or receive large unit trains, even though they may not be serving these markets at this time.

Table 4.4 Locations Equipped to Load and Unload Unit Trains

Location[21]	Load	Unload
Albina Yard (UPRR)	Intermodal	Intermodal
Brooklyn Yard (UPRR)	Intermodal	Intermodal
Terminal 6 (Port of Portland)	Intermodal, Auto	Intermodal, Auto
Terminal 5 (Port of Portland)	N/A	Grain, Mineral Bulks
Lake Yard (BNSF)	Intermodal	Intermodal
Port of Morrow (UPRR)	Intermodal, Wind Energy	Intermodal, Grain, Wind Energy
Clatskanie (BNSF via PNWR)	Ethanol	Grain
Arlington (UPRR)	N/A	Municipal Waste Containers
Boardman (UPRR for PGE)	N/A	Coal

Most shippers in Oregon are carload shippers, meaning they ship less than what is required to create an entire train. Although the Class I railroads are required by law to provide service for carload traffic at a reasonable return, in some cases carload service may be too costly and thus unprofitable to the Class I. The economics lead them to prioritize the more profitable business, which includes unit trains. Sometimes this leaves carload shippers without rail service.

SERVICE PERFORMANCE MEASURES

To maximize performance, operating staff work to ensure that trains perform optimally along the mainlines. For that to happen, delays must be avoided and time spent for a crew change, at servicing points, and in yards must be minimized. Train delays are often caused by conflicting train movements. A slower train may have to pull into a siding to allow an expedited train to pass. The more congested the line, the more often these types of delays occur. With respect to crew time, FRA regulations limit crew shifts to a maximum of 12 hours, which is approximately the amount of time it takes a non-expedited train to travel from Pasco or Hinkle to Portland. If train delays cause the 12-hour limit to be exceeded, then a new crew must be delivered to the train before it can continue to its destination. It is easy to see how delays can quickly become compounded and cause ripple effects down the line.

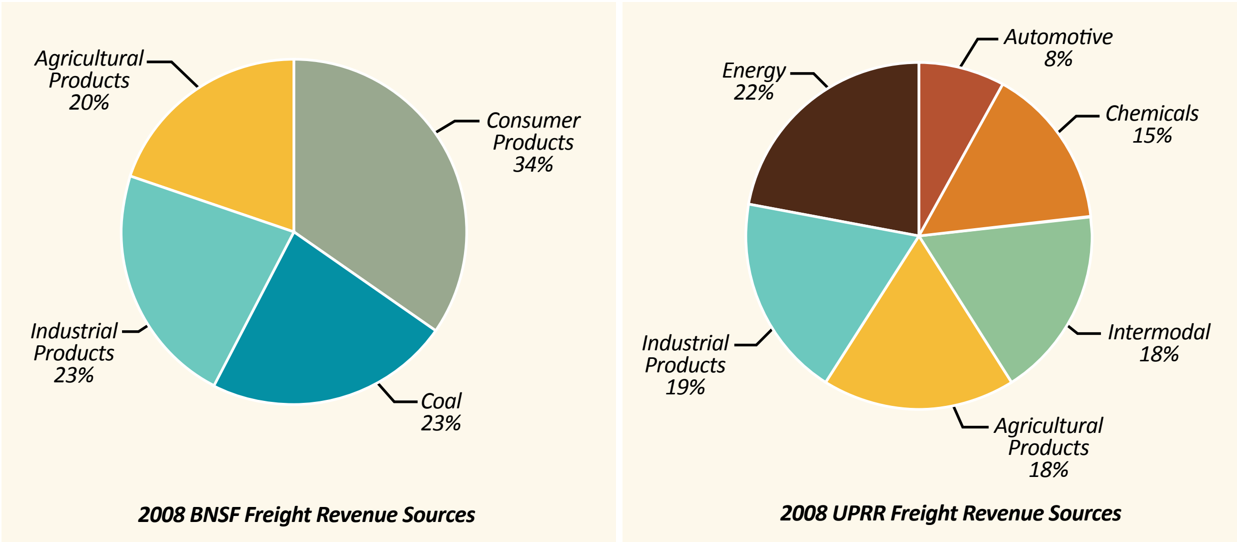
21 See Figure 3.5 for Yard locations.

PRICING AND REVENUE

BNSF and UPRR base their business decisions on national freight markets and operating dynamics, which affect all Oregon shippers. Oregon-generated products are handled predominantly by UPRR, and Washington rail products are handled primarily by BNSF because of track ownership and operating rights established in the late 1800s and early 1900s.

The pie charts in Figure 4.8 show the revenue composition by product in 2008 for BNSF and UPRR, respectively.

Figure 4.8 BNSF and UPRR Freight Revenue Sources in 2008



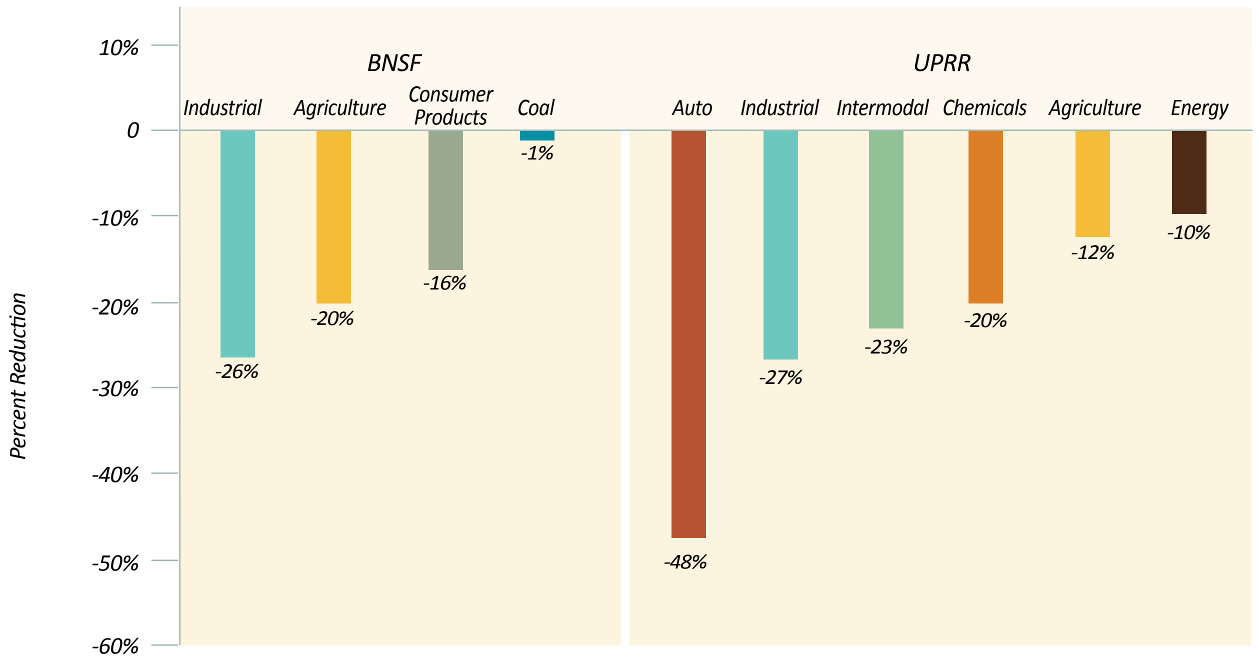
Sources: Burlington Northern Santa Fe Corporation. 2009. 2008 Annual Report and Form 10-K. http://www.bnsf.com/investors/annualreports/2008annrpt.pdf. Accessed August 17, 2009.
Union Pacific Corporation. 2009. 2008 Annual Report and Form 10-K. http://www.up.com/investors/attachments/secfiling/2009/upc10k_020609.pdf. Accessed August 17, 2009

RECESSION IMPACTS

Volumes on both Class I railroads declined during the 2008-2009 recession. As shown in Figure 4.9, all of UPRR's and BNSF's business lines have experienced a decrease in carload volume. The two Class I railroads' 2009 Oregon revenue was down 28 percent from 2008.

Both UPRR and BNSF maintained their pre-recession levels of investment in the maintenance and infrastructure improvements during the recession to prepare for the eventual return of business. Both railroads have had to store locomotives and rail cars and furlough employees. Due to the combination of lower volumes and improved operating practices, both railroads have increased velocity on their lines. For example, instead of running shorter trains, which would yield little in crew, fuel or equipment savings, UPRR increased train sizes to create fewer train starts and improve on-time arrivals and customer satisfaction.

Figure 4.9 BNSF and UPRR Reduction in Carload Volumes; 1st Quarter 2008 Compared with 1st Quarter 2009



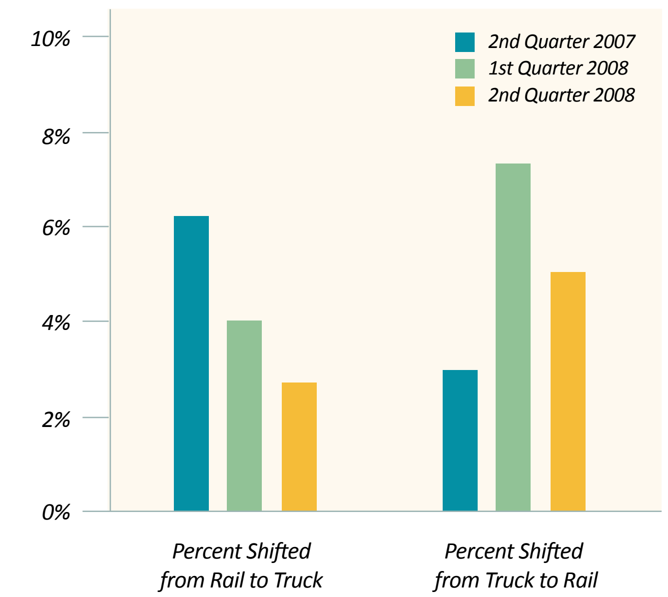
RISING FUEL COST

Immediately prior to the 2008-2009 recession, diesel fuel costs rapidly rose to unprecedented levels, forcing some trucking companies out of business. As rail carried goods remained flat in 2008, income for Oregon's Class I railroads (UPRR and BNSF) increased approximately 20 percent as the railroad industry offset a portion of increased fuel costs with fuel surcharges. One of the reasons national railroads are not impacted as much as trucking companies from more expensive diesel fuel is that diesel locomotives are much more fuel efficient than trucks. Trains move one ton of freight 413 miles on one gallon of fuel. Another reason is that higher oil and fuel costs drive up domestic demand for coal and ethanol, as are corn and fertilizer (inputs for making ethanol), all of which are chiefly transported by rail. For these reasons, national freight railroads benefited as the price of oil climbed 37 percent in five months starting January 2007 and stayed high for the rest of the year.

Figure 4.10 compares the shift of freight between the truck and rail modes from 2007 and 2008. The quarterly surveys of the first half of 2008 show that the shift of freight from truck to rail exceeded the shift of freight from rail to truck.[22]

22 "More freight moving to rail from truckload," *Supply Chain Digest*, September 10, 2008

Figure 4.10 Percentage of Freight Moving from Rail to Truck and Truck to Rail



Freight Operations of the Shortline Railroads

As described in more detail in Chapter 2, many of Oregon's rail lines were originally built in the late 1800s and early 1900s to support the forest products-based economy. Most of the existing shortline companies were established when Class I railroads sold off or leased less-profitable portions of their systems following deregulation in the 1980s. Oregon's shortline railroads range from very small operations that serve industrial enclaves in a compact geographic area to companies that operate many miles of old Class I branch lines. In their various functions, they form a vital link between Oregon industries and the national rail network. Figures 3.9-3.24 in Chapter 3 detail current operations on each shortline.

Shortline ownership structures in Oregon vary. PNWR and WPRR are owned by a publicly traded company, Genesee & Wyoming, which is one of the largest shortline holding companies in the country. PNWR's local management makes decisions based on regional operations and markets. However, they also answer to their Connecticut headquarters to provide the best value for all shareholders nationally. Other shortlines, such as AERC, are privately and locally owned. The COP is municipally owned, and the POTB and the former Eugene-Coos Bay line (now called the Coos Bay Rail Link or CBRL) are owned by port authorities. (See Chapter 3 for maps of all shortline railroads.)

MARKETS AND SERVICE

Shortline railroads provide local delivery and pickup service to shippers on their lines and collect, or aggregate, outbound rail cars for delivery to Class I railroads. Historically and today, forest products are the mainstay of most Oregon shortlines. This is a concern because forest products are projected to decline by 2035. Some shortlines have diversified their revenue streams by developing new short-haul movements of products such as sand, gravel, and rock. Others, such as MH and COP, also run tourist trains.

It is important to note that none of the shortlines handle intermodal freight. Intermodal service requires facilities to move containers from trucks to rail, and the ability to meet an expedited schedule. In order to participate in this growing market, shortlines must establish expedited service aggrements with Class I carriers, build facilities to transfer containers, and in many cases upgrade existing infrastructure.

Some intra-Oregon rail movements have been developed, almost all involving PNWR. Trains move sand and gravel from Hopmere (north of Salem) to either Wilsonville or Hillsboro. Logs are also transported in both directions between Rainier and Eugene (and in the past, some logs have been shipped from Cottage Grove). At this time, a reload facility in Eugene handles logs destined to mills in the Roseburg area.

Compared to the Class I rail networks in the state, the shortline network is significantly under-used and has the potential to handle much greater volumes of traffic. A major obstacle is the need for funds to address deferred maintenance. The century-old infrastructure that was created to ship forest products does not match the freight traffic needs of today's economy. That infrastructure needs to be upgraded and repaired to allow faster speeds and greater weights and volumes of cargo. One of the goals of the *Oregon Rail Study* was to inventory conditions of the shortline railroad infrastructure and to determine what would be required to upgrade the lines to make them potentially more profitable. (See Chapter 3 for information on the condition of the shortline infrastructure and the estimated costs to upgrade it.) The ability to handle more and different products would allow the shortline railroads to diversify their traditional market base and lessen their dependence on the declining forest products market.

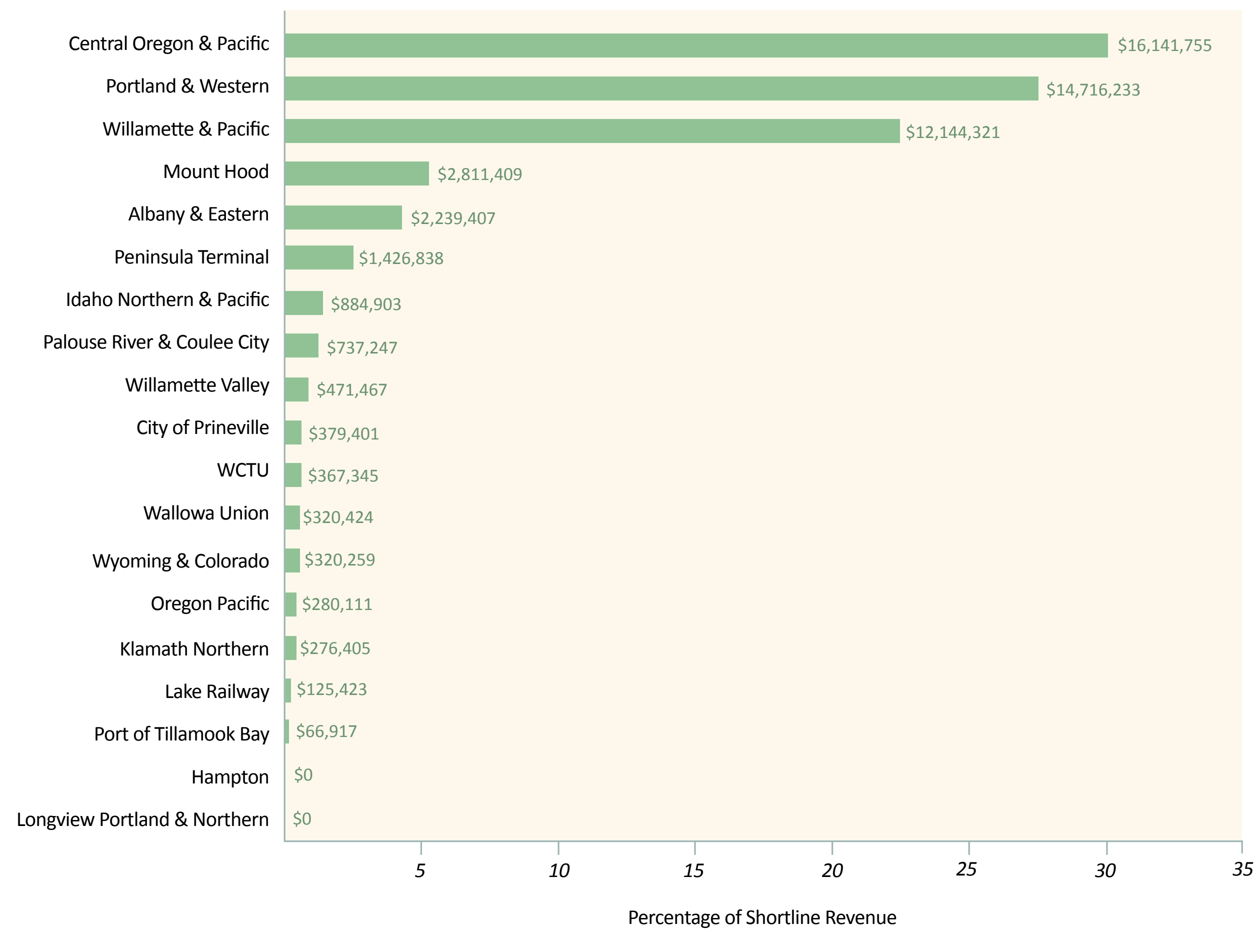
Oregon is not alone in this situation. Many states are exploring alternative roles for shortline entities, including involvement in and specialized short-haul freight movement and commuter rail operations. The smaller scale and community engagement typical of these rail companies facilitates their participation in local initiatives for economic development and infrastructure improvements. Opportunities exist for Oregon to strategically assist shortline operators through policies, research and planning, and management of grant programs to fulfill statewide transportation goals.

PRICING AND REVENUES

Shortlines typically generate enough revenue to cover their operating costs, but struggle to generate sufficient revenue to cover capital maintenance. These railroads are dependent on state and federal grants and loans for infrastructure improvements. Figure 4.11 presents 2009 annual shortline revenue.

One of the competitive advantages of a shortline railroad is a more flexible workforce, which reduces crew costs and results in more responsive service for shippers. For example, shortlines have more flexibility to serve customers at different times of day. Another benefit is the lower cost to access the line as the shortlines don't require as robust of infrastructure to serve the customer as the Class I railroads. However, the operational benefits of some shortlines can be constrained by contractual restrictions, or "paper barriers," in agreements with the Class I railroads. When the tracks were sold or leased by Class I railroads to the shortline railroads, the agreements stipulated that the shortlines could only interchange with the seller/leasor. Most shortlines in Oregon are limited by these agreements. Two examples include CORP and PNWR. CORP bought the track between Springfield and Ashland from SP (later part of UPRR). When CORP's shipments move beyond its line, they are only allowed to interchange with the UPRR, even though the infrastructure is in place to access the BNSF. On occasion, UPRR grants a waiver to this paper barrier for a specific movement, thus allowing CORP to interchange cars with BNSF or another shortline railroad. Another example is PNWR, which operates branches acquired from BNSF and UPRR and exchanges shipments with both railroads. However, PNWR cannot offer customers on a former UPRR line access to BNSF, nor vice versa, and thus its flexibility to provide shippers with competitive service options is limited.

Figure 4.11 Annual Revenue by Shortline Railroad (2009)



Note: CBRL was not in service in 2009.

RECESSION IMPACTS

The shortlines were severely affected by the 2008-2009 recession, and its long-term effects remain to be seen. Even before the downturn, most shortline railroads were unable to cover their capital investment costs, and several are now struggling simply to meet operating costs. Volumes declined significantly as a result of the recession, leaving some shortline corridors at risk. Shortline revenues were down 23 percent from 2008.

Several branches of shortlines serve only a single customer, a situation that compounds their risk. For example, PNWR serves the Georgia-Pacific paper mill in Toledo. If the mill were to close, the branch would lose its reason to exist.

The recession provided one new source of revenue to some shortline railroads, that of storing excess rail cars for the Class I railroads at a rate of $1 to $3 per day per car. The additional revenue has helped the smaller companies weather the recession and some will probably continue receiving this revenue for the foreseeable future.

AT RISK CORRIDORS

Potential line abandonments by shortline railroads are driven by multiple factors, including high capital costs, low rates of cargo diversification, and the inability to tap into growing markets. Line abandonments can effectively cut off access to the national rail network for many carload rail shippers and dozens of communities around the state. Each railroad is different and there is not a simple one-size-fits-all approach to measuring long-term viability. The purpose of this analysis is to alert policy makers and agency leaders of the vulnerabilities in the rail system and thereby provide an opportunity for intervention.

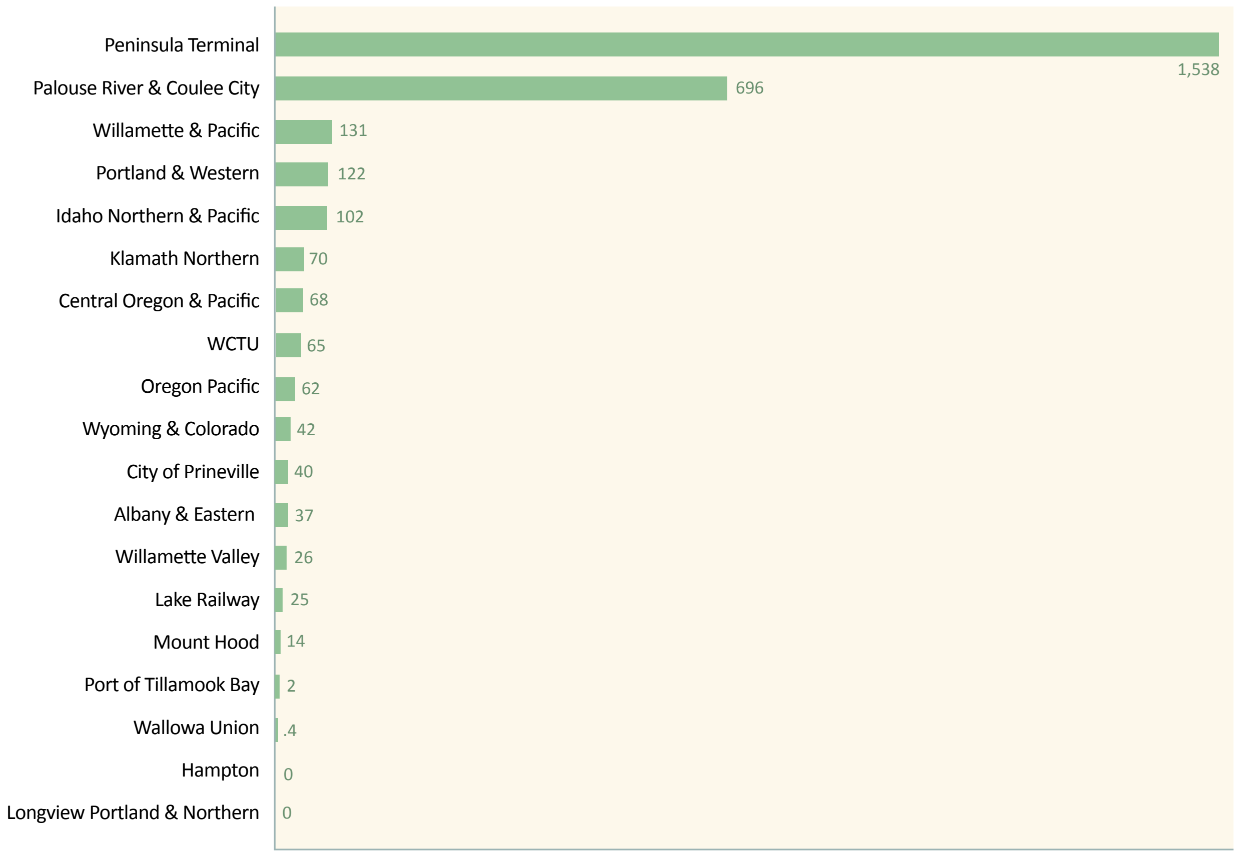
Carloads per mile is one measure (Figure 4.12). However, it does not tell the whole story. This statistic is developed using information for entire shortline companies, and is not reported by smaller line segments. A railroad that has sufficient carloads overall may still be interested in abandoning an un-profitable segment in its system. The carloads per mile measure misses this nuance. Other methods for identifying at risk corridors include revenue per mile, interviews with rail operators, and actions by rail operators. All of these factors were used to compile the list of lines or line segments at risk of closure in Oregon.

In 1993 the Interstate Commerce Commission suggested using the following four carloads per mile categories to assess rail company health:

- Below 25 carloads per mile: Viability of the line is unlikely, except under special circumstances such as shipper ownership, willingness of local government to subsidize the line, or a very short distance with optimal conditions.
- Twenty-five to 50 carloads per mile: The line may be successful if the railroad is not responsible for track maintenance and taxes, as for example if the track is owned by a government which assumes these responsibilities.

- Fifty to 100 carloads per mile: Chance for success is good if other conditions for success are favorable.
- Over 100 carloads per mile: Success is almost assured assuming other conditions are normal.

Figure 4.12 Carloads per Mile (2009)



Note: CBRL was not in service in 2009.

Based on this criteria, eight Oregon shortlines may be at risk but closure isn't a certainty. Mount Hood Railroad with only 14 carloads per mile is not considered at risk because its passenger related revenue is not part of the carloads per mile formula. In 2004, City of Prineville Railway (COP) had only 5 carloads per mile. By 2009, COP's carloads had risen to 40 per mile and are expected to continue to grow due to a revised business model. Thus, COP is not considered at risk. There are six line segments that may be at risk because they were identified as such by the owner, the track has been removed, or there is no business on that segment (typically the segment is at the end of a line).

The 14 at risk lines or line segments include:

- Albany & Eastern, Bauman to Sweet Home (Figure 3.9)
- Central Oregon & Pacific, Ashland to Montague, CA (Figure 3.10)
- Hampton Railway, entire line (Figure 3.22)
- Lake Railway, entire line (Figure 3.15)
- Longview Portland & Northern, entire line (Figure 3.12)
- Oregon Pacific, Liberal to Molalla (Figure 3.17)
- Port of Tillamook Bay, Cochran to Tillamook (Figure 3.20)
- Portland & Western, Wauna to Tongue Point (Figure 3.21)
- Portland & Western, Hillsboro to Forest Grove (Figure 3.21)
- Wallowa Union, entire line (Figure 3.13)
- Willamette & Pacific, Greenberry to Monroe and Dawson (Figure 3.22)
- Willamette & Pacific, Gerlinger to Dallas (Figure 3.22)
- Willamette Valley Railway, entire line (Figure 3.23)
- Wyoming & Colorado, entire line (Figure 3.24)

Rail Growth Opportunities

The *CFF* data was further reviewed to analyze how truck and rail freight move between regions and how that flow aligns with Oregon's rail corridors (as shown in Figure 3.3) to determine where new rail markets may exist. The findings are as follows:

- The Portland area has the heaviest rail volume in Oregon and the highest amount of truck traffic. Continued freight growth will exacerbate congestion both on the truck and rail networks. Rail strategies which allow shippers in other parts of the state to bypass Portland may curb increased congestion in the Portland metro area.
- The east-west rail corridor between Portland and Hermiston has the second most volumes after Portland. The long haul market between Portland and locations east of Oregon is well penetrated by the rail carriers and is reflected in the truck and rail data. Intrastate truck flows are not nearly as dense on the I-84 corridor as they are on the I-5 corridor. Supporting strategies to expand capacity in this corridor will allow for continued growth of this important and busy freight rail line.
- The Chemult/California corridor has the third highest rail volumes in the state because this is where north-south UPRR traffic merges with BNSF traffic along the Oregon Trunk rail line. However, most of the rail traffic is moving through the Klamath Region, not moving freight in or out of the region. This is also one of the lowest density truck regions in the state. The unique rail dynamics of this region would support large-scale rail customers that are not there today and may provide rare access to both Class I rail lines.
- The Salem Region is the second densest region in the state and it has significant truck flows to the Southern Region and East Region as well as Metro Region. In general, most of the freight trucked in the state is along the I-5 corridor. The Class I network in the I-5 corridor is capacity constrained. However, the shortline rail network is well developed in this corridor and underused. A strategy to develop an intrastate rail market in the I-5 corridor would provide modal choice to shippers and yield positive benefits to the state in the form of reduced congestion and GHG emissions.
- The East Region has more trucked freight than its population would indicate and has limited access to the rail network. A strategy which provides rail connectivity for this region will provide modal choice and economic benefit for the region.
- The Southern Region is the third highest truck volume region but has the lowest density rail corridor. Strategies to provide modal choice for this region would benefit the shippers and also reduce I-5 traffic.
- The Coastal Regions host low truck volumes. Of the three regions, the North Coast Region has the highest truck volume and is well served by rail. The Central Coast and Southern Coast Regions have some of the lowest truck and rail volumes in the state, but the commodities are dependent on the economies offered by the rail mode. A strategy which supports adequate rail service to coastal communities would provide economic benefit to those regions.

Table 4.5 Market Opportunities and Challenges

Rail Market Opportunities	Reasons for the Opportunities
Commodities moved by truck could shift to rail in the I-5 corridor, particularly between the Southern Oregon and Salem Regions and the Metro and Salem Regions	The most comprehensive shortline network is located along the densest trucking corridor, I-5. Southern, Salem, and Portland Metro regions show significant truck flows in base year, 2002, and 2035 forecast year.
Top commodities currently trucked could be compatible with rail shipping	Clay, Concrete, Glass and Stone category moves between all regions could be rail-compatible depending on length of haul and origin/destination. Farm Products, Recyclables, Municipal Solid Waste, and Alcoholic Beverage categories are rail-compatible and move between all regions. Miscellaneous Manufactured Products category is projected as the fastest growing commodity and can be compatible with rail and intermodal transport.
Rail Market Challenges	**Reasons for the Challenges**
Lack of facilities to transload rail cars in Portland metropolitan area	Few industries in the Portland Metro area are served directly by a rail spur. To receive rail freight there must be a facility nearby where the commodities can be either stored or transferred between railcars and truck for regional shipment.
Congestion and choke points	Congestion limits growth in Portland, the WES corridor and in the I-84 corridor.
Lack of agreements to allow CORP, CBRL and PNWR to freely exchange local traffic in the Eugene area	All movements connecting these shortlines must use UPRR trackage in the Eugene area. UPRR must approve the business commercially and accommodate the move operationally.
Current market conditions have made trucking very competitive with rail	Trucking costs in some corridors are so low that it is not profitable for the rail carriers to handle freight they might otherwise carry.
Access to the Port of Portland is limited to UPRR, BNSF and PTRC	Shortline railroads must interchange with UPRR or BNSF to access the Port of Portland. The Class I railroads set the price, accommodate the move, and sometimes provide cars if needed. Decisions by the Class I railroads to accommodate these moves are based on profitability and are therefore not always granted.
Commercial restrictions on shortline connectivity by Class I Railroads	Commercial barriers from historical agreements between railroads "paper barriers".
The East Region shows significant truck freight volumes but is the most isolated rail corridor in terms of rail service	While the East Region contains the UPRR mainline, regional shippers are not always granted access commercially or operationally. There are a few shortline operations but they are very small in scale compared with the Willamette Valley.

STRATEGIES FOR OREGON

The dynamics of the railroad business may inadvertently leave parts of Oregon without rail service in the future. The trends in the Class I rail market and the tenuous nature of the shortlines present challenges for Oregon. Although the state's ability to influence business decisions of the railroads is limited, some opportunities exist for the state and railroads to partner to pursue mutually beneficial goals. These opportunities are geared at creating large volumes to encourage Class I service and/or reinforcing the viability of the shortlines.

INCREASE CAPACITY

Identify locations where additional facility or track capacity may be needed to support the growth of rail-served industrial areas. Facilities with enough trackage to support unit train delivery and handling will be well positioned to secure rail service into the future. Typically the Class I railroads require a three to one ratio, meaning a facility must have capacity to handle the equivalent of three unit trains at one time so that a facility can simultaneously accommodate one loaded train with another train due to arrive.

One example is in central Oregon on the BNSF Oregon Trunk line, which is predominately used for through trains moving between California and the Pacific Northwest. In order to preserve rail access for local shippers in the region, a public private partnership could construct some parallel infrastructure, including mainline tracks, sidings and/or yard tracks, and provide financial or operational incentives for BNSF to allow shortline operations on the line in the long term. The additional infrastructure would allow a shortline operator serving local shippers and the Class I through trains to coexist in the corridor.

DEVELOP HUB FACILITIES

Develop hub facilities, similar to the Prineville Freight Depot, where customers ship and receive freight by truck, then the facility loads and unloads the freight into/from railcars and interchange the cars in larger train segments with Class I carriers. This provides operational savings for the Class I carriers by minimizing switching activities and consolidating the volumes of several shippers. Expanding these types of facilities will provide greater carload volumes to the Class I carriers at one location, thereby making the business more attractive for handling, while providing more options and competition for customers.

Many potential locations exist for these types of hubbing facilities. They could be located along Class I mainlines to combine existing and future carload customers or along shortlines. Possible locations along the Class I network include areas with access to both Class I carriers, like Klamath Falls, or locations where it is difficult for shippers to access the rail network, like along the UPRR in eastern Oregon. Potential shortline hubbing locations could provide access to the rail network for local shippers while shoring up the railroads by increasing carloads.

Siting these facilities in locations where freight demand is expected to grow will increase the market opportunities for the shortlines, rail customers, hubbing facilities and Class I carriers alike. Locations with high freight demand and available rail capacity, such as the Southern and Salem Regions of Oregon should be prioritized. As noted earlier, the Southern Region has the third highest volume of truck traffic but the lowest density rail corridor in the state. The majority of freight trucked in the state is intra-Oregon, which indicates that if a viable inter-Oregon rail service offering along with hub facilities existed, there could be a conversion of truck traffic to rail for some products. Potential locations for hubbing facilities to serve this market are located between Salem and southern Oregon, including some that have access to both Class I carriers, like between Albany and Lebanon.

Growth in the I-5 corridor is further explained in the New Intermodal and Intra-Oregon Opportunities section below.

GRAIN AGGREGATION

Although eastern Oregon grain growers are physically located near the UPRR east-west mainline route, they have not been able to consistantly attain dependable and affordable rail service. Some grain growers can access Columbia River barges, but for growers located farther away from the river, this is more difficult. Aggregating, or creating critical mass of one commodity in order to create unit train volumes, may attract rail service for this important Oregon market.

A special grain hub could be built at a strategic location for those growers located more than 100 miles from the Columbia River. This facility would gather and store volumes from local growers and load railcars and collect the cars into unit train volumes. Discussions with UPRR are required to determine if there is a business case robust enough for them to participate in a project financially and also to discuss operational considerations and equipment availability.

Once a general location for a facility has been determined, potential sites will need to be identified and the transportation options for connectivity to the Class I rail system; including trucks and shortline railroads, will need to be analyzed. Facility needs must be determined, including on site and off site rail infrastructure. A comparable example is the grain facility at Ritzville in eastern Washington developed by BNSF. Farmers truck and use a connecting shortline to move grain to the BNSF facility where railcars are loaded before moving to the export elevators on the lower Columbia River and Puget Sound. According to BNSF, this is the first short-haul unit train operation by a Class I carrier in the country. This model may be applicable to grain shippers in eastern Oregon.

PURCHASE AND OWN EQUIPMENT

Sometimes lack of equipment limits access to rail service. In these cases, consider public ownership of rail cars as a means for securing rail service that otherwise would not be available. For example, Washington State purchased grain cars that are now used by BNSF and UPRR to transport wheat and barley from shippers in eastern Washington to export grain elevators along the Columbia River and Puget Sound.

INDUSTRIAL DEVELOPMENT ON CLASS I NETWORK

Although some smaller customers find it difficult to access Class I rail service, existing and new large-scale rail users, with the proper rail infrastructure, can reasonably expect service now and into the future. There are many locations in Oregon where both Class I carriers would welcome a new large-scale industrial customer. These large-scale rail users, moving 500,000 tons or 20,000 containers per year, can benefit from having access to both Class I carriers. This gives the customer competitive pricing and service, more shipping options, and access to a larger market territory covered by two railroads. There are areas in Oregon exceptionally well suited for large-scale industrial development because they have large quantities of land available and are served by both Class I carriers. Again, these are not the only developable sites, but they are unique for the potential access to Class I rail competition.

- Klamath Falls is a location with excellent connectivity to both BNSF and UPRR. It is also a crew change location, services locomotives, has yard infrastructure and potential for future shortline connectivity, and has large amounts of land available. The rail dynamics for freight in this area are rare in Oregon.
- The area between Klamath Falls and Chemult, 75 miles to the north, has access to both Class I carriers, which share the same track.
- The track along the Oregon Trunk between the Columbia River and Bend also is shared operationally and commercially accessible to both BNSF and UPRR. Most of the current industrial activity is between Madras and Bend. Yard and siding capacity is relatively limited due to the small yards in Redmond and Bend and also because of grade crossings located near the yards. However, there are several large parcels of land available for industrial development and rail service is feasible.
- The Rivergate Industrial Area in north Portland is directly accessible by both carriers for unit train operations. Carload movements are subject to switching agreements between BNSF and UPRR. Since Portland is the major hub in the state, there is excellent support infrastructure and robust operations. Land, however, is constrained as most of it has already been developed.
- Some sites between Harrisburg and Eugene lend themselves to large-scale rail-served development. Sites in this area could have physical access to both lines because the lines are located near each other. These sites need to be assessed on a case-by-case basis in order to determine the viability of Class I access and land availability.

CAPITAL INVESTMENT

Maintaining and upgrading deteriorating rail infrastructure is especially challenging for shortline railroads. Continued state investment in the shortlines, through programs like *Connect*Oregon, is key to preserving the shortline network. Other possibilities could include low-interest loans or tax incentives for rail infrastructure upgrades; however, given the financial state of many of the shortlines, these types of programs might not be realistic given their limited revenue to repay the loan or invest in capital improvements. In some cases, public ownership may be the only option to preserve at-risk rail corridors.

In addition to infrastructure, shortlines typically own and operate older, less-fuel efficient locomotives. Providing incentives and/or assistance for replacing older locomotives with more fuel efficient and "greener" locomotives would reduce operation costs and GHG emissions.

NEW INTERMODAL AND INTRA-OREGON OPPORTUNITIES

The decline of forest products and the increase of intermodal shipments present shortlines with opportunities and challenges. Commodity flow projections indicate an opportunity for intermodal rail moves, especially within Oregon's I-5 corridor. However, no intermodal rail facilities exist in the I-5 corridor outside of Portland where containers can be transferred between trucks and rail. Additional intermodal facilities in the I-5 corridor south of Portland could allow shortlines to haul intermodal products and interchange with the Class I railroads, and/or deliver to local customers or regional hubs. This could relieve congestion pressure on the Portland metro region in the long term by moving some of the trucking activity from intermodal facilities in the Portland area to a location farther south.

Corridors with the greatest potential for intra-Oregon moves are between Salem and southern Oregon, where freight truck traffic is expected to grow by 66 percent, and between Portland and Salem, where freight truck traffic is expected to grow by 160 percent. Railroads in these corridors include PNWR, AERC and CORP. However, to realize the full potential of this I-5 shortline network, contractual agreements must be reached between the Class I carriers and shortlines. For example, all movements connecting PNWR and CORP in Eugene must use UPRR track. UPRR must approve the business commercially and must accommodate the move operationally. Facilitating arrangements for exchanging local intrastate shipments are key to improving efficiency of the railroad network, but must be reached between the private parties.

In addition to intermodal freight, several other rail-friendly commodities are expected to grow, including: clay, concrete, glass, stone, farm products, alcoholic beverages, recyclables, and municipal solid waste. All of these commodities are moving between all Oregon regions, mostly by truck, and are expected to be the highest growth commodities in Oregon over the next 20 years.

Summary of Freight Rail Industry Studies

The Class I railroads operate vast networks and are vital to the national and state economy. They are large, complex, competitive companies focused on making the best business decisions for each of their networks. Understanding the Class I business model, and how Oregon fits in it, is the first step in determining how Oregon can affect the rail industry in the state.

Freight rail economics favor long-distance movement of large volume, unit train shipments as a means of obtaining maximum tonnage and revenue on their capacity-constrained networks. In some cases, this approach has changed circumstances for access to the rail network by small volume carload shippers. Oregon is a relatively low volume state with many industries dependent upon carload shipping. Therefore, investments to improve capacity in Oregon are not necessarily a priority of the Class I railroads as they must provide the best return on investment accross their multistate networks.

The 2008-2009 recession forced cut-backs by both BNSF and UPRR. However, both railroads are financially sound and well positioned to recover when volumes return. While traffic is low, they have continued to invest billions in maintenance improvements.

The large railways can be expected to invest as required to protect their competitive advantage in the national market. However, these investments will not necessarily address the needs of Oregon customers seeking access to rail service for shorter distances or smaller volume movements.

Shortline carriers play an important role in connecting smaller communities and shippers to the national rail system. In contrast to the Class I railroads, Oregon's shortlines have available capacity, but there are challenges related to the decline in the market and the capital intensive nature of the business.

Finally, shortlines have historically played a distinctive role in many regions of Oregon. The decline in forest products have left the shortline network in a marginal state in need of capital support to overcome decades of deferred investment. Potential line abandonments driven by high capital costs, low rates of cargo diversification, and the inability to tap into growing markets would effectively cut off access to the national rail network for many carload rail shippers and dozens of rural communities around the state.

Strategies for Oregon to plan and partner with railroads to preserve and expand rail access in Oregon include: increasing capacity, developing hub facilities for transloading and aggregating shipments, maximizing or preserving existing rail-friendly land for future or existing rail served industries, improving deteriorating infrastructure, and growing intra-Oregon rail traffic.

Intercity Passenger Rail Service

This chapter discusses intercity passenger rail service. Chapter 6 discusses another form of passenger rail, commuter rail. Both intercity passenger rail and commuter rail typically operate over the privately owned freight rail system. Intercity passenger rail runs from city to city and may be "high-speed" defined by the FRA as service that "is reasonably expected to reach speeds of at least 110 mph." Commuter rail is specific service that caters to commuters by serving several cities within the same metropolitan area during commuting hours. Intercity rail service is usually distinguished from commuter service by the longer distances traveled, higher speeds, and longer distances between stations.

Current intercity passenger rail service in Oregon includes two Amtrak *Cascades* train roundtrips per day and three *Thuway* bus roundtrips per day through the Willamette Valley, sponsored by the State of Oregon with revenue generated from the sale of vehicle custom license plates. In addition, Amtrak sponsors one daily roundtrip of the *Coast Starlight* between Los Angeles and Seattle and one daily roundtrip of the *Empire Builder* between Portland and Chicago. The *Cascades* station stops include Eugene, Albany, Salem, Oregon City and Portland and continue north to Vancouver, BC. The *Thruway* buses stop in Eugene, Albany, Salem and Portland. The *Coast Starlight* stops in Klamath Falls, Chemult, Eugene, Albany, Salem and Portland. The only stop for the *Empire Builder* in Oregon is in Portland.

Oregon is part of a federally designated high-speed rail corridor, PNWRC, between Eugene and Vancouver, BC. This designation was granted in 1994 based on projected ridership, public benefits, and anticipated partnership participation of faster and safer intercity passenger rail in the future. For the first time, in 2009 the federal government made available over $10 billion for planning and capital investment for states' intercity passenger rail programs, the HSIPR program. Oregon has applied for and received funding from the HSIPR program for three Oregon projects in Portland and, as of spring 2010, applied for another round of funding to update the *Oregon Rail Plan* and to prepare an assessment in accordance with the National Environmental Policy Act, including an Alternative Analysis. These efforts are a prerequisite to federal funding for major corridor improvements.

The Challenge

Accommodating rising demand for passenger and freight service, especially in the Willamette Valley, presents a major challenge for the private rail industry, a challenge that affects the broader context of the state's economy and transportation system. The *Cascades* and *Coast Starlight* trains operate on the UPRR mainline track today and compete with UPRR freight trains for the limited track capacity of this line. The *Empire Builder* operates on the BNSF, but is only in Oregon a total of nine miles from Portland, north to Vancouver, WA. Planning agencies forecast population to grow by as much as 44 percent, over one million people, between 2000 and 2030 in the Willamette Valley.[23] The *OTP* projects an 80 percent increase in freight tonnage. As UPRR freight business grows and adds more freight trains to meet growing demand, expanding the number of passenger trains to meet demand will be challenging.

23 *Forecasts of Oregon's county population and components of change, 2000-2040,* Oregon Office of Economic Analysis, 2004.

Regional and state transportation plans include some limited capacity improvements, but there are no plans to build capacity into the highway and rail systems to match this projected growth. Without an increase in capacity, the demand will exceed the available freight and passenger rail capacity in the Willamette Valley. Congestion in the I-5 corridor and on the UPRR mainline will cause backups, delays, and spillover of traffic onto other north-south highways and rail routes not designed for the demand.

Public interest in energy-efficient alternatives to personal auto travel continues to grow as a result of increasing highway congestion and concern about climate change and America's dependence on imported oil. ODOT is examining alternatives to increase intercity passenger rail capacity in the I-5 corridor. Improving the frequency and quality of passenger rail service will require substantial public investment, so a careful study of Oregon's options is important. To better understand the capacity limitations of the current rail lines in the I-5 corridor, ODOT commissioned two studies:

- *Portland to Eugene Intercity Passenger Rail Assessment*, Appendix F
- *Eugene to Ashland Intercity Passenger Rail Assessment*, Appendix G

Intercity Passenger Rail: Portland to Eugene

The *Portland to Eugene Intercity Passenger Rail Assessment*, Appendix F, analyzed, at a high level, the current and future conditions on two existing parallel rail lines to determine the feasibility of hosting improved intercity passenger rail service between Portland and Eugene. Other alignment options, such as building an entirely new corridor, were not included in this assessment but will be considered in a future Alternatives Analysis.

As mentioned previously, intercity passenger rail between Portland and Eugene is part of a broader initiative for high-speed rail service in the Northwest. Washington and Oregon have planned, studied, and hosted state-sponsored passenger rail service on the PNWRC since 1994. State planning efforts in 1992, 2001, and again in 2006 concluded that the Willamette Valley section of the PNWRC should continue to be developed for expanded intercity passenger rail service to meet expected population growth in the region.

Successful passenger service requires reliable, disciplined operations with consistent on-time performance. Service goals were developed to compare the two existing routes. These goals are draft and will be refined through the *Oregon Rail Plan* update to begin in 2010. The draft service goals include:

- Increase on-time performance of passenger trains (from 68 percent to 95 percent or higher)
- Increase daily roundtrips (from two to six or more)
- Increase average passenger train speeds (from 42 to 65 mph)
- Reduce passenger rail trip time between Eugene and Portland (from two hours and 35 minutes to two hours or less – the same time as it takes to drive between these cities along the freeway)
- Avoid negative impacts to freight rail capacity and operations

Benefits from the improved service include:

- Avoid expenditure of $20 billion in highway user costs, including travel time, incidents, vehicle operating costs, and highway maintenance
- Reduce carbon emissions in support of national and state policies and efforts to reduce GHG emissions and slow climate change
- Enhance intermodal connections to existing and planned commuter rail, light rail, streetcar, bus service, park and ride, and bike/pedestrian facilities compatible with regional and local plans within the corridor

To meet these draft service goals, Oregon has identified improvements needed to provide additional passenger and freight rail capacity on the UPRR mainline and the PNWR's OE line.

EXISTING ROUTE OPTIONS: PORTLAND TO EUGENE

The intercity rail study used a computer model to compare two alignment alternatives for expanding intercity passenger service between Eugene and Portland. One alternative would use the UPRR mainline and the other would use the OE line. Figure 5.1 shows the two alignments.

CURRENT CONDITIONS

PASSENGER SERVICE

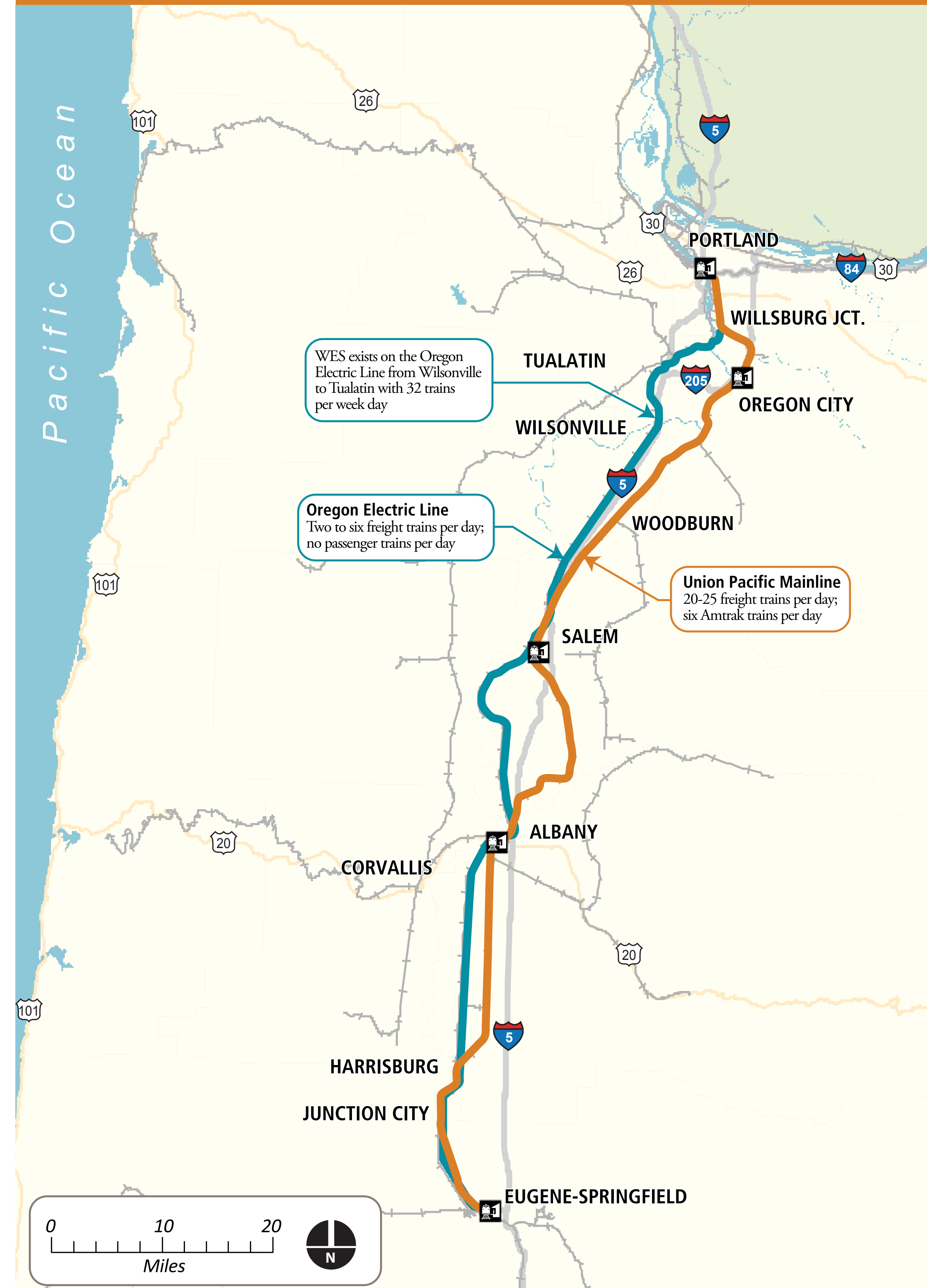
Today, passengers traveling between Portland and Eugene have six daily roundtrip options: two Amtrak *Cascades* trains and three intercity *Thruway* buses, all sponsored by ODOT and the Amtrak *Coast Starlight*. The two Amtrak *Cascades* trains run from Eugene to Portland in the morning and on to Seattle and Vancouver, BC. Both *Cascades* trains from Portland to Eugene run in the afternoon/evening. The buses run at other times to provide a link to Amtrak train service at Portland's Union Station.

The trains run on the UPRR mainline track, which carries many more freight trains on the same route (see Chapter 4 on Freight Rail Service). The scheduled travel time each way between Portland and Eugene is two hours and 35 minutes. On-time performance averaged 68 percent in 2009-2010.

UNION PACIFIC MAINLINE CONDITION AND CAPACITY

The UPRR mainline track and bridges are in good condition for its current service, but not for "high-speed." It is predominantly a Class 4 line, allowing freight trains to travel 60 mph and passenger trains to travel 80 mph. UPRR's centralized communication system for controlling train traffic supports a maximum 79 mph operating speed for passenger trains, but only seven miles of the Portland to Eugene route is posted for 79 mph. Today's average speed is 42 mph over the 124 miles between Portland and Eugene. The UPRR mainline carries up to 25 freight trains a day. Freight demand projected to 2030 could increase that volume to 35 or more trains a day.

Figure 5.1 Portland to Eugene Intercity Passenger Rail Study Corridors



To meet the increased daily roundtrips outlined in the draft service goals, UPRR stated that a second track would have to be added throughout the corridor, and a third track will be needed in some locations, as well as other infrastructure improvements. UPRR has stated that the average speed goal of 65 mph is not feasible "given route alignment, curvature and traffic density" and that speeds would be limited to 79 mph. UPRR has also stated that electric catenary will not be allowed.

OREGON ELECTRIC LINE CONDITION AND CAPACITY

The OE rail right-of-way parallels the I-5 corridor between Portland and Eugene and is operated by the PNWR. It is predominantly a Class 2 line, allowing freight trains to travel 25 mph and passenger trains to travel 30 mph. Current conditions limit speeds where the track runs within streets in Salem, Albany, Junction City, and Harrisburg. Several bridges along the corridor likely will need rehabilitation or reconstruction in the next 10 to 15 years in order to keep train speeds at their current levels, regardless of passenger service on the line. The OE operated an independent passenger service on the line in the early 1900s, but later shifted to freight service. Today, UPRR, ODOT, and BNSF each own a part of the line (see Figure 5.2) and PNWR owns/leases the freight rights. Freight traffic dominates the OE corridor, with the exception of the area between Wilsonville and Tualatin where Westside Express Service (WES) commuter rail operates 32 trains per week day that continue north to Beaverton. PNWR operates approximately two to six freight trains per day between Portland and Eugene. The freight service moves goods between local clients and locations served by both UPRR and BNSF. There is modest but growing short-haul local traffic.

ODOT worked with PNWR to identify improvements necessary to meet the draft service goals. These include rebuilding the entire line, adding a second track in some locations, new connections, and two new stations. PNWR is open to speeds faster than 79 mph and electrification.

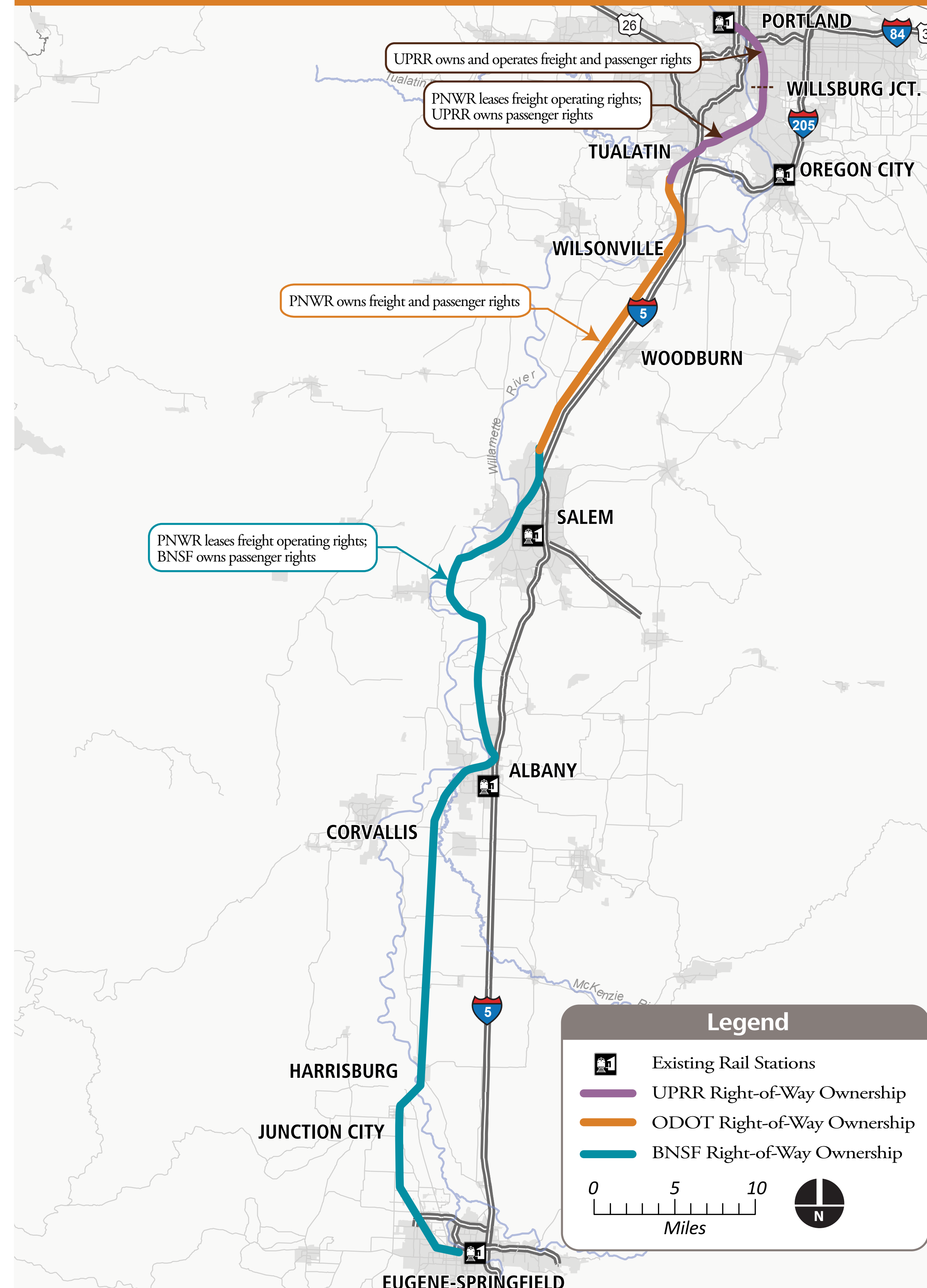
MODELING ASSUMPTIONS COMMON TO BOTH ALTERNATIVES

To establish current conditions, actual ridership counts from 1998 and 2008 were used to calibrate the statewide travel model. The model then projected future passenger ridership between Portland and Eugene under three levels of service on the UPRR and OE lines. The three scenarios were:

- A baseline "no-change" scenario for 2030 was created on the UPRR line only, keeping the existing service of two roundtrip trains per day, with travel time assumed at three to three and a half hours each way to account for increased freight traffic
- Two roundtrip trains per day, with a two hour travel time each way, and continuing to have three bus trips per day
- Six roundtrip trains per day, with a two hour travel time each way, and no buses

Maximum operating speed today is 79 mph for passenger trains on the UPRR corridor. The two- and six-daily roundtrip scenarios assumed that track, signal control, and

Figure 5.2 Ownership on the OE Line



crossing improvements would enable the trains to achieve an increase in maximum running speed from the current 79 mph to 90 mph. Some sections of the UPRR line south of Albany and north of Eugene could be improved to allow for maximum train speeds of 110 mph. Those improvements were included in the cost estimates and ridership forecasts. However, UPRR has objected to speeds over 79 mph.

Between Portland's Union Station and Willsburg Junction in the southern area of Portland both alternatives were assumed to use the existing UPRR mainline. At Willsburg Junction, the OE and UPRR alternatives diverge onto their respective corridors.

Additional design and environmental studies of both alternatives would need to address known issues that were outside the scope of the feasibility study. For example, residences, schools, and commercial buildings are built close to both the existing tracks in several sections of the existing right-of-way. The proximity of those land uses may be worsened by the double-tracking needed for the additional capacity under both alternatives. Implementation of quiet zones to eliminate train horn noise along the corridor will require further study and will need to be factored into the design and engineering costs.[24]

UPRR ALIGNMENT ALTERNATIVE AND ASSUMPTIONS

The UPRR alternative assumes that both passenger and freight service would continue to use the existing UPRR mainline, as shown in Figure 5.1. Projects on the UPRR mainline that are already under way or that are funded by 2012 were assumed to be completed. Analysis of the UPRR alternative assumed that a complete second mainline track between Eugene and Portland will be necessary to reach acceptable levels of on-time performance under either a two- or six-daily roundtrip scenario. UPRR has confirmed this assumption, and detailed other requirements and limitations, for the six daily roundtrip scenario. Stations on the UPRR line would likely remain unchanged: Eugene, Albany, Salem, Oregon City, and Portland.

OE ALIGNMENT ALTERNATIVE AND ASSUMPTIONS

The OE alternative would shift service as much as possible onto the existing OE right-of-way, but at some locations, trains may need to use UPRR track and dispatching services. Intermediate stops on the OE line could be the same as for the UPRR line, except that the Oregon City station would be replaced by a Tualatin or Wilsonville station to connect with the WES Beaverton to Wilsonville commuter rail.

The OE alternative was evaluated in eight segments between Willsburg Junction and Eugene, and options were developed in segments 2, 6, and 8 to account for cost, freight train operations, or potential environmental impacts. The OE alternative and alignment options are shown and described on Figures 5.3 - 5.6. It is important to note that the options shown are not exhaustive, but rather a sample of the many different options.

24 *Final Rule on the Use of Locomotive Horns at Highway-rail Grade Crossings*, Federal Railroad Administration, 2009. http://www.fra.dot.gov/us/Content/1318

Figure 5.3 OE Alternative between Portland and Eugene

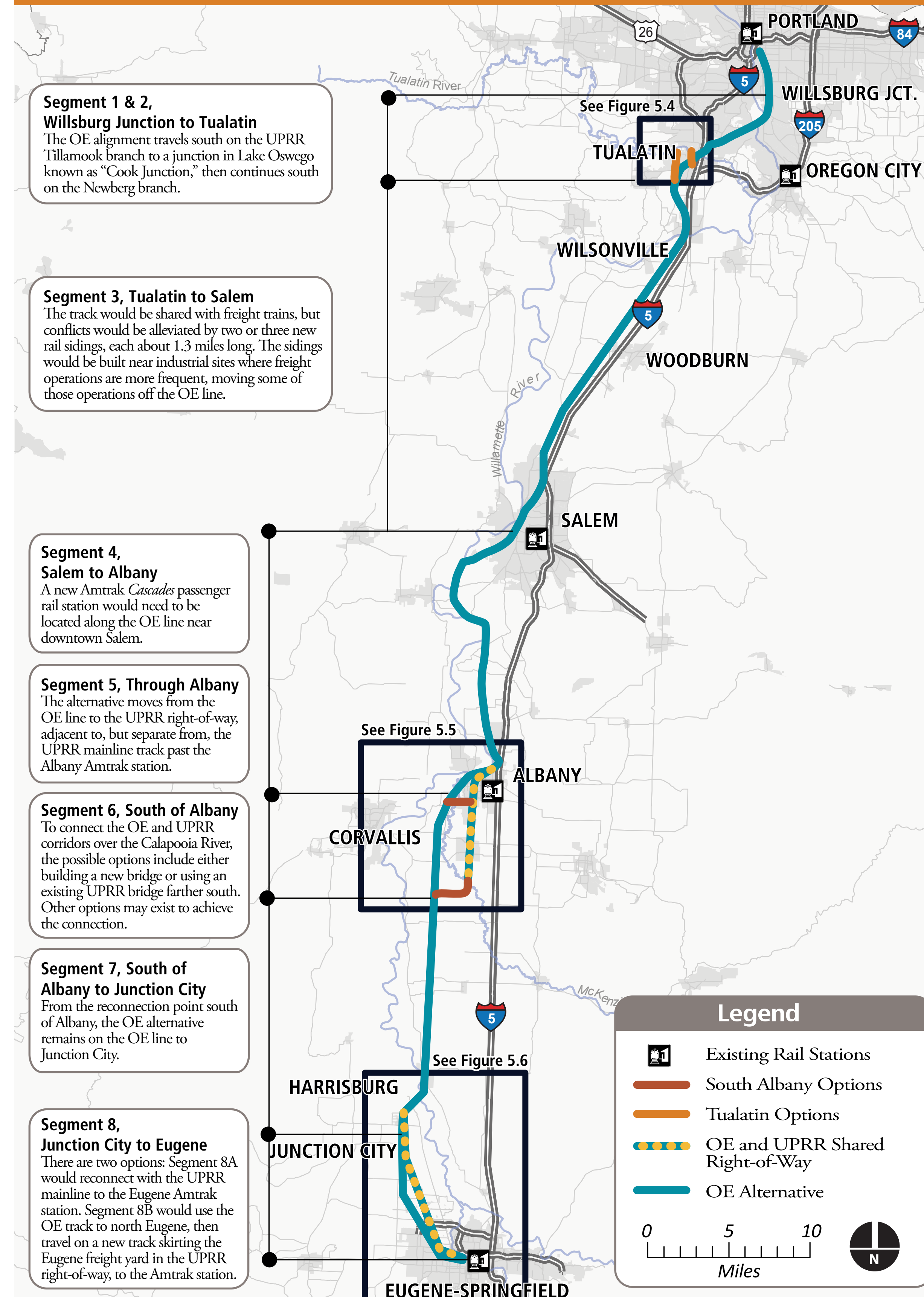


Figure 5.4 Alignment Options in Tualatin Area for Segment 2 of the OE Alternative

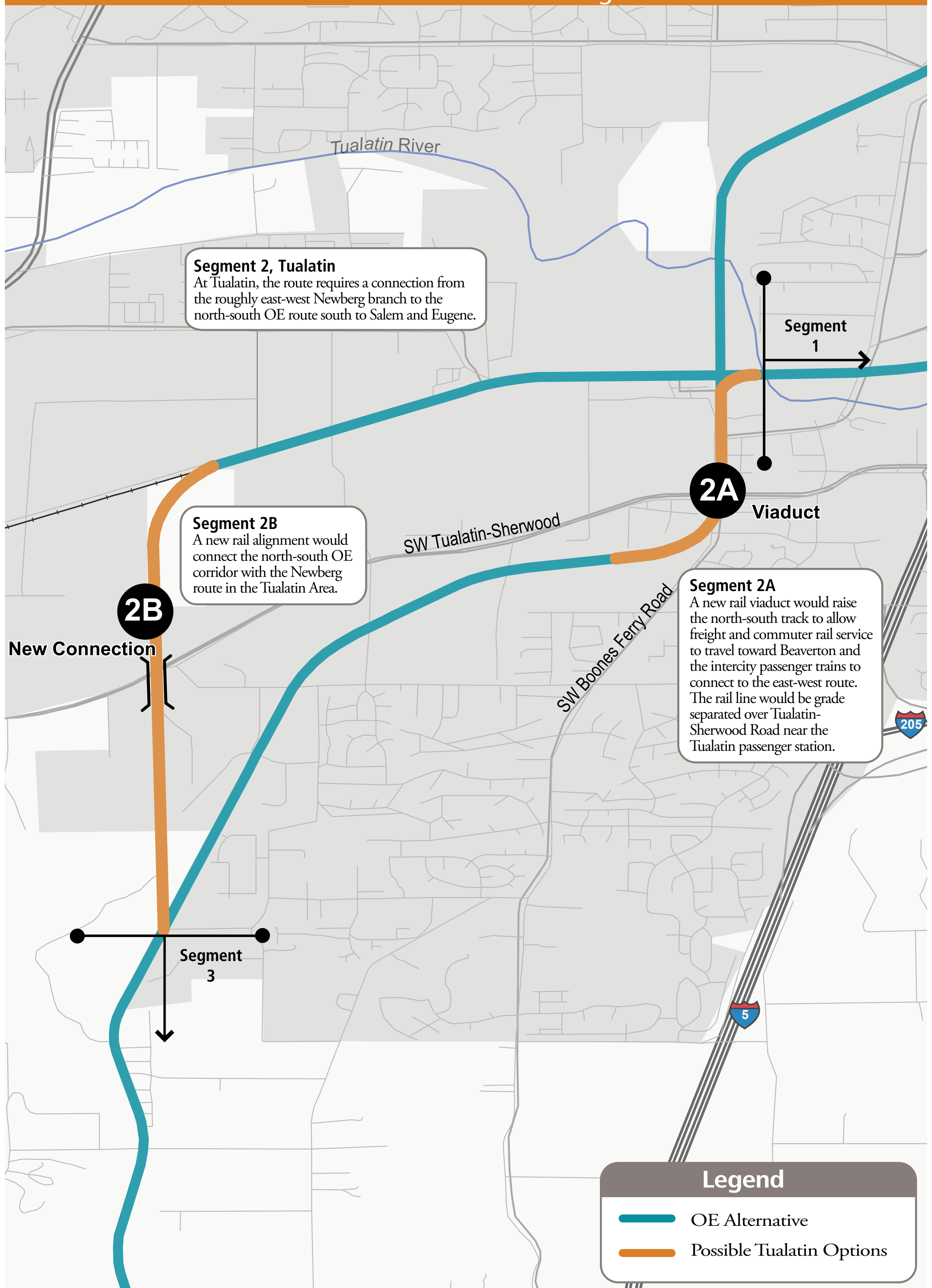


Figure 5.5 Alignment Options between Albany and Junction City for Segment 6 of the OE Alternative

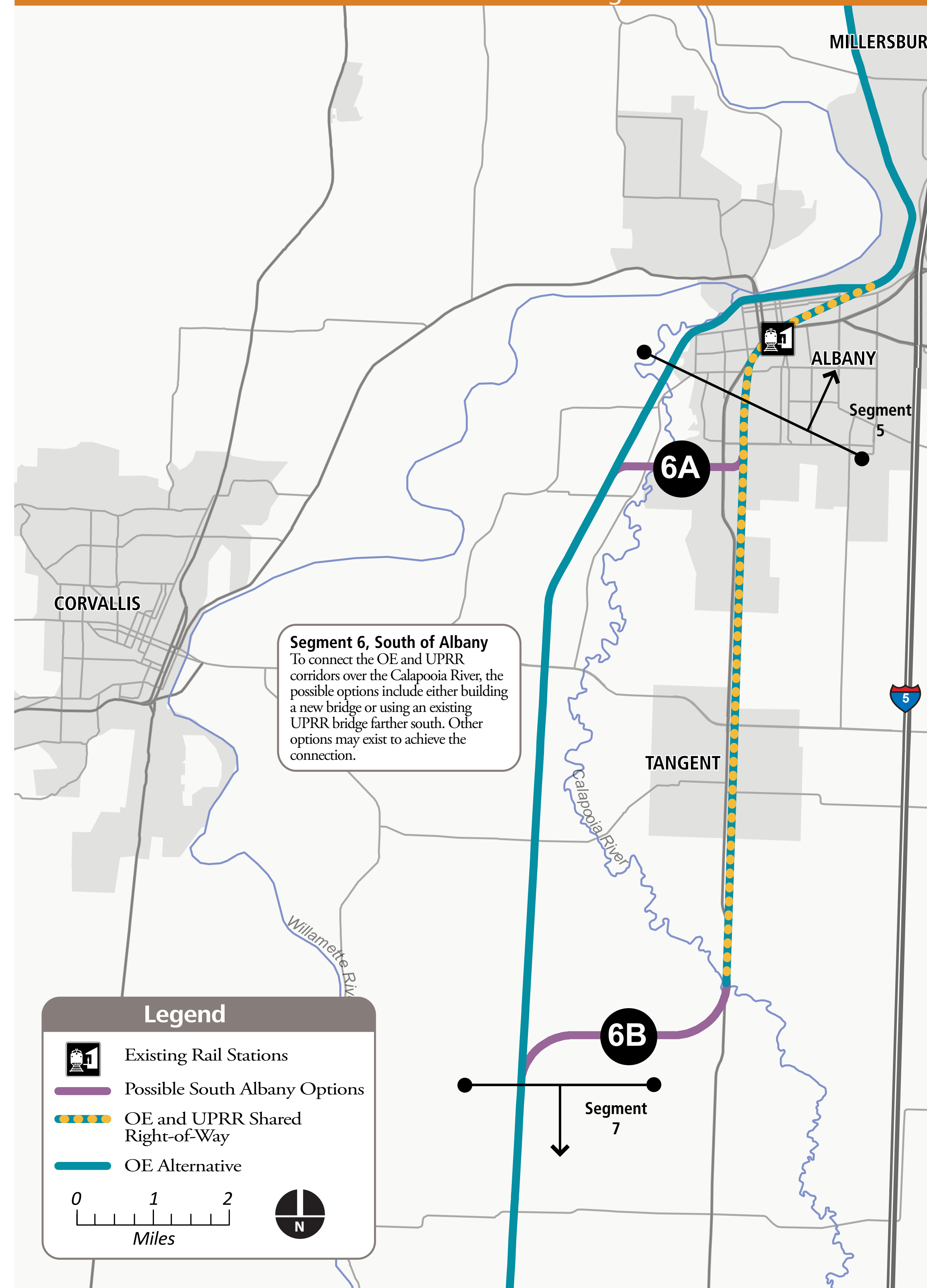
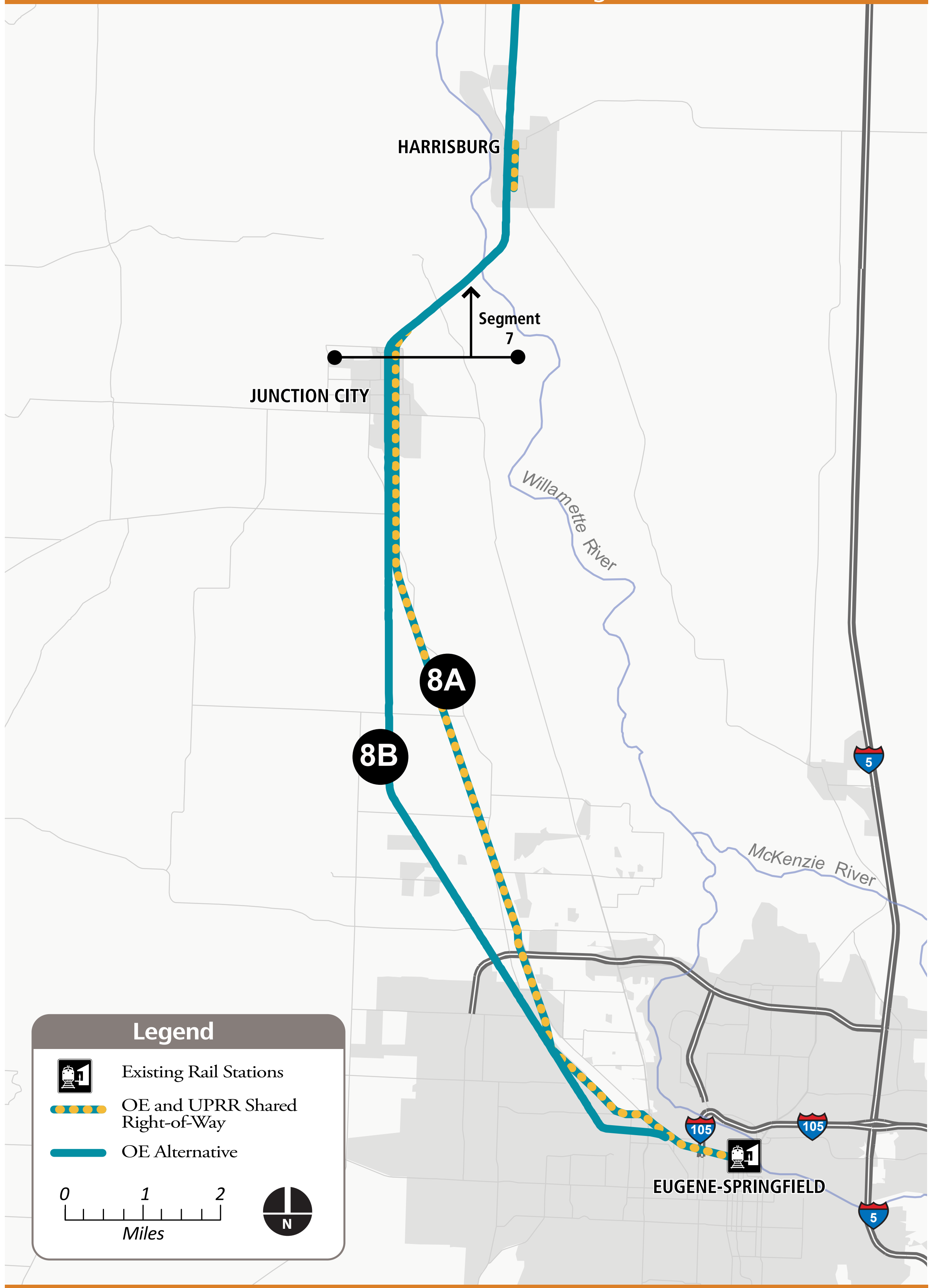


Figure 5.6 Alignment Options between Junction City and Eugene for Segment 8 of the OE Alternative



CORVALLIS OPTION

A connection between Corvallis and Albany was also tested as part of this study. The analysis assumed six daily roundtrips under either the OE or UPRR six-roundtrip scenarios. The model indicated that ridership on the Albany to Corvallis connection would be between 8,000 and 18,000 passengers per year by 2030. However, to assess the feasibility of offering rail service more frequently, a more detailed analysis is necessary. The model cannot provide a precise ridership forecast for trips shorter than 50 miles. The cost estimate to upgrade this 12-mile segment is over $150 million.

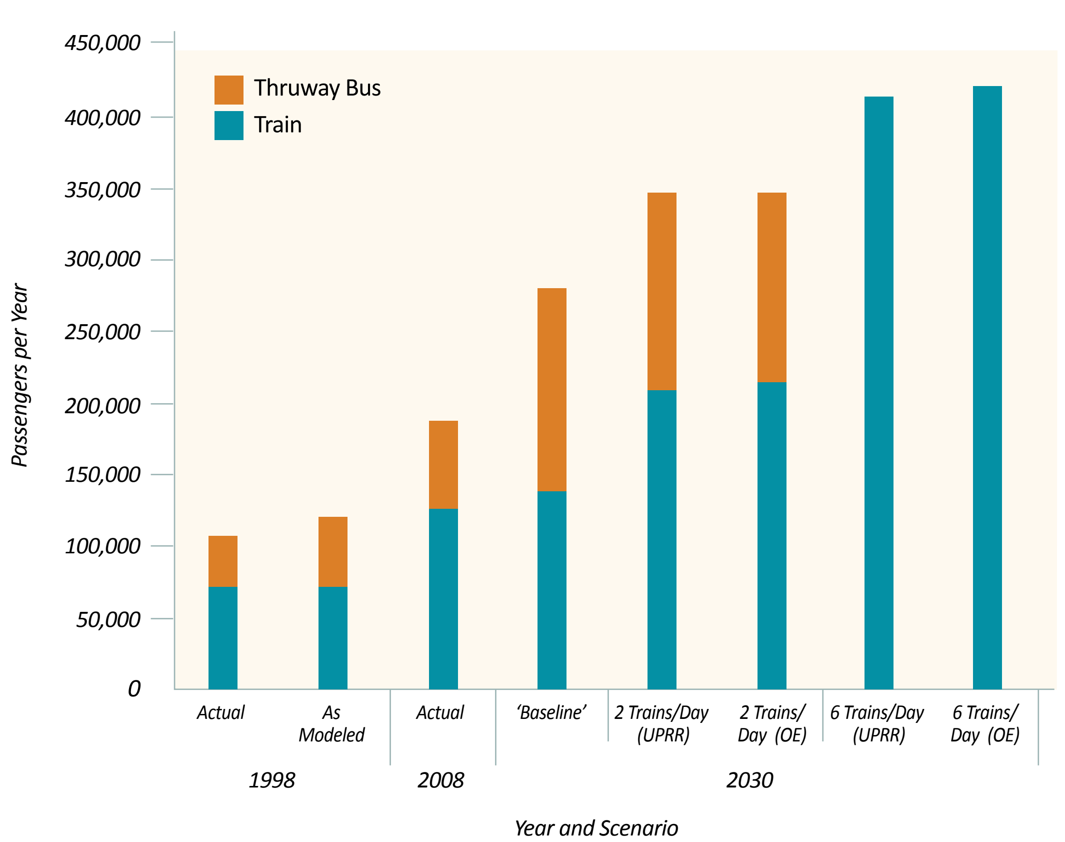
RESULTS OF MODELING FOR PORTLAND TO EUGENE INTERCITY ALTERNATIVES

RIDERSHIP ESTIMATES

The annual passenger ridership trends forecasted for the entire line are shown in Figure 5.7 for all scenarios under both alternatives. Ridership between stations is not reported because the model was not calibrated to fully evaluate the alternatives at that level of detail.

The highest growth in ridership would occur under the scenarios having six trains per day and improvements to increase train speeds and thereby reduce travel times. With six trains a day, ridership would more than double (increasing by 120 to 124 percent) by 2030.

Figure 5.7 Ridership Estimates for the Alternatives



If service levels remain the same—two trains per day and three buses—but train speeds increase because of track improvements, ridership on either the UPRR or OE lines would grow by 84 to 85 percent by 2030 compared to 2008. Travel time would decrease by 20 to 35 minutes compared to 2008.

The least growth in ridership would occur if service continues as-is, with no improvements. With the same service levels as 2008 and no unplanned improvements to the line, travel times degrade to between three hours and three hours and 15 minutes per trip from two hours and 35 minutes in 2008. The UPRR ("baseline") alternative in 2030 shows an increase in ridership of only 49 percent over ridership in 2008, compared to doubled ridership with improvements. Traffic congestion on I-5 will slow speeds for *Thruway* buses and limit the growth of ridership on those buses between 2008 and 2030.

The OE alternative would attract slightly more riders than the UPRR alternative under both the two-trains/day and six-trains/day scenarios. Although more detailed modeling is necessary to fully quantify this ridership difference, a qualitative review of the alternatives indicates that this increase in ridership may be a result of relocating the Salem passenger rail station to a more pedestrian- and transit-accessible downtown location as part of the OE alternative, in addition to the fact that this alternative would connect intercity passenger rail to the WES commuter rail.

FREIGHT SERVICE

The OE alternative would benefit both UPRR and OE freight service. Track and capacity improvements would improve operating speeds for freight trains traveling on the OE line. Even with aggressive growth, PNWR's freight density would be significantly less than the level of the UPRR mainline, making coexistence of freight and passenger rail much easier. Removing passenger trains from the UPRR line would free that capacity for freight trains. UPRR's railroad management has expressed interest in segregating passenger service from high-density freight mainline services.

IMPROVEMENT COSTS

Investment required to reach the draft service goals on the UPRR alternative is estimated to cost over $2.1 billion. However, since this estimate was developed, UPRR has formally communicated that the 65 mph average speed is not feasible on the UPRR line, that speed will be limited to a 79 mph max, and that additional infrastructure beyond that included in the $2.1 billion is required to meet the six daily roundtrips. The OE alternative is estimated to cost $1.8 billion. Costs were estimated for both the UPRR and OE alternatives based on unit costs for similar passenger and freight rail projects in the western US. Right-of-way acquisition is not included.

Table 5.1 presents the cost for the alternatives by type of improvement.

Table 5.1 UPRR and OE Alternatives Cost Estimates

			UPRR		OE	
Cost Element	Unit	Unit Cost	Units	Cost	Units	Cost
Track - New with Subgrade	Mile	$2,500,000	87	$217,500,000	66	$165,000,000
Track – Replace/Upgrade	Mile	$1,000,000	0	$0	111	$111,000,000
Track- Replace Ties Only	Mile	$500,000	100	$50,000,000	0	$0
Double Crossovers	Each	$2,000,000	8	$16,000,000	7	$14,000,000
Stations and Platforms	Each	$10,000,000	0	$0	2	$20,000,000
Platforms Only	Each	$500,000	4	$2,000,000	0	$0
Signals & Communications (does not include Crossings)	Mile	$1,000,000	124	$124,000,000	124	$124,000,000
Maintenance and Support Facilities	Each	$10,000,000	1	$10,000,000	1	$10,000,000
Crossings - All Public Crossings	Each	$500,000	105	$52,500,000	111	$55,500,000
Safety Improvements	Lump Sum	$0	0	$25,000,000	0	$25,000,000
Bridges- Replace Timber with Concrete	Foot	$4,800	0	$0	15,804	$75,859,200
Bridges- Replace Steel	Foot	$19,500	0	$0	2,544	$49,608,000
Bridges- Replace Timber with Double Track Concrete	Foot	$9,600	11,602	$111,379,200	0	$0
Bridges - Replace Steel with Double Track Steel	Foot	$39,000	3,236	$126,204,000	0	$0
New connections (Albany & Tualatin)	Lump Sum	$0	0	$0	0	$72,184,700
Subtotal				$734,583,200		$722,151,900
Construction Contingency		40%		$293,833,280		$288,860,760
Construction Inflation (6 years at 5%)		34%		$349,759,962		$343,840,998
Preliminary Engineering Services (PE & NEPA)		12%		$123,409,978		$121,321,519
Final Design (including ½ inflation)		15%		$180,494,469		$177,439,974
Construction Engineering (including full inflation)		17%		$234,289,995		$230,325,122
High Track Occupancy		25%		$257,104,120		$0
Total cost in 2016 dollars				$2,173,473,003		$1,883,940,273

PASSENGER RAIL ELECTRIFICATION

Given concerns about GHG emissions, dependency on fuel imports, and the cost of fuel, one of the forward-looking questions ODOT asked was whether the UPRR or OE line could be electrified for passenger trains and if the benefits would justify the investment. Because the rail lines are privately owned and operated, the host railroad must agree to the electrification. Consultation with the major operators revealed that electrification could be acceptable on the OE line, but would not be acceptable on the UPRR line.

The feasibility assessment of electrifying the OE line between Eugene and Willsburg Junction looked at using both traditional and solar electricity sources. The assessment aimed to identify:

- The elements of electrification
- The environmental conditions favorable for solar power
- Whether solar power could provide sufficient energy to off-set the energy used by the passenger trains
- The potential reduction in carbon emissions
- The cost to electrify the OE line

THE ELEMENTS OF ELECTRIFICATION

There are three elements to electrification: ownership of the line, design (catenary versus third-rail), and type of equipment.

UPRR, ODOT, and BNSF own the OE line from Portland to Eugene, and PNWR owns/leases the operating rights, see Figure 5.2. UPRR, BNSF, and PNWR would all need to agree in order to electrify the entire line. UPRR will not allow electrification for its six-mile mainline segment.

There are two ways to electrify a rail line. Catenary electrification, involves the construction of an overhead cable system that delivers energy to electric trains. The other way is third rail electrification, which supplies electricity to trains via small, ground-level rails installed either at the side of or between the tracks. In general, at-grade crossings preclude the use of an exposed third rail due to safety and security reasons. Since there are over 250 public and private at-grade crossings on the OE line, the assessment assumed that catenary technology would be the most appropriate technology.

If the OE line were electrified, trains would still need to travel on non-electric segments of UPRR's mainline. In that case, the service would require hybrid locomotives that can run on both an electrified line and a standard (diesel-powered) line. Such locomotives are used in Europe but are uncommon in the US. Three railroads operate dual-mode diesel-electric/third-rail locomotives in the New York area. All three services use a third-rail design. The Pacific Northwest lacks comparable examples, but the King County/Metro transit buses that enter downtown Seattle are dual-mode diesel and electric buses that use overhead catenary. Dual-mode catenary locomotives have yet to be approved for use in the US.

SOLAR POWER CONDITIONS IN THE WILLAMETTE VALLEY

Solar power can be measured by the average annual photovoltaic solar radiation per square meter per day. Typically, solar power is considered a favorable option when the capacity is about 5.0 kWh. In Portland, Salem, and Eugene, the amount of average annual photovoltaic solar radiation capacity ranges from about 4.0 to 4.5 kWh, close to but slightly under the 5-kWh threshold. Because the efficiency of solar panels has improved over time and the solar capacity is close to the threshold, Oregon can continue to explore this option in the future.

SOLAR POWER REQUIREMENTS FOR ELECTRIC PASSENGER TRAINS

A one to two megawatt (MW) system every 10 miles would supply sufficient energy for six roundtrip trains per day. Each MW system site would occupy between six and 12 acres of public land, close to the point of connection to the local utility, but not directly in the rail right-of-way. Twelve-acre sites would allow for sufficient capacity for load growth for the future electric needs as train service grows.

Under the current state "net metering" laws, each site could not generate more than two MW. Net metering is the term used to define how the energy generated from the solar arrays would be used by the local utility company for sale and distribution and then credited against the state's power bill for the energy used by the trains.

REDUCED CARBON EMISSIONS WITH SOLAR POWER

GHG or carbon dioxide (CO2) emissions from six diesel roundtrips per day would equal 8,851 tons per year. If 109 miles[25] of the 124-mile corridor were electrified with solar power, GHG emissions would be reduced to 767 tons per year, a 91 percent reduction.

CAPITAL COSTS, FUNDING, AND PAY-BACK PERIOD

The entire solar power electrified rail project for the OE line would cost $360 million. The costs to electrify a rail line by building a catenary system are estimated at $3 million per mile, or $327 million for the 109-mile line segment. The additional cost to electrify with solar power is $300,000 per mile, or an additional 10 percent.

Financing the solar portion of the capital costs could be accomplished through state ownership or third-party ownership.

State ownership would involve state purchase and installation of the photovoltaic panels. Under agreements with the local utilities, power generated would be uploaded to the power grid and then be discounted from the state's electric bill. The investment would be returned by 2050 with service of six roundtrips per day.

Third-party ownership of the arrays and the power generated by them would allow private companies to leverage federal tax credits and depreciation to pay for the installation costs. ODOT's Solar Highway project uses this approach. The State of Oregon would pay little or nothing above the initial $327 million used for the catenary line but would need to purchase the electricity for the trains. The pay-back period with third-party ownership of the solar arrays and the energy would be much longer, over 100 years.

25 A portion of the line—the UPRR segment—would not be electrified.

Intercity Passenger Rail: Eugene to Ashland

Interest in the Willamette Valley passenger rail corridor spurred renewed interest in the feasibility of providing passenger rail service between Eugene and Ashland on the CORP line. To determine its feasibility, existing rail facilities were evaluated and ridership and specific capital improvements and their costs were estimated.

The existing rail line between Eugene and Ashland is operated by CORP, and is known as the Siskiyou line. CORP representatives indicated a willingness to consider passenger operations in the corridor provided that freight operations would not be adversely affected. The current infrequent freight movements are compatible with passenger operations if there were an investment in capacity. An upgraded line would accommodate projected freight traffic and two roundtrip passenger trains per day.

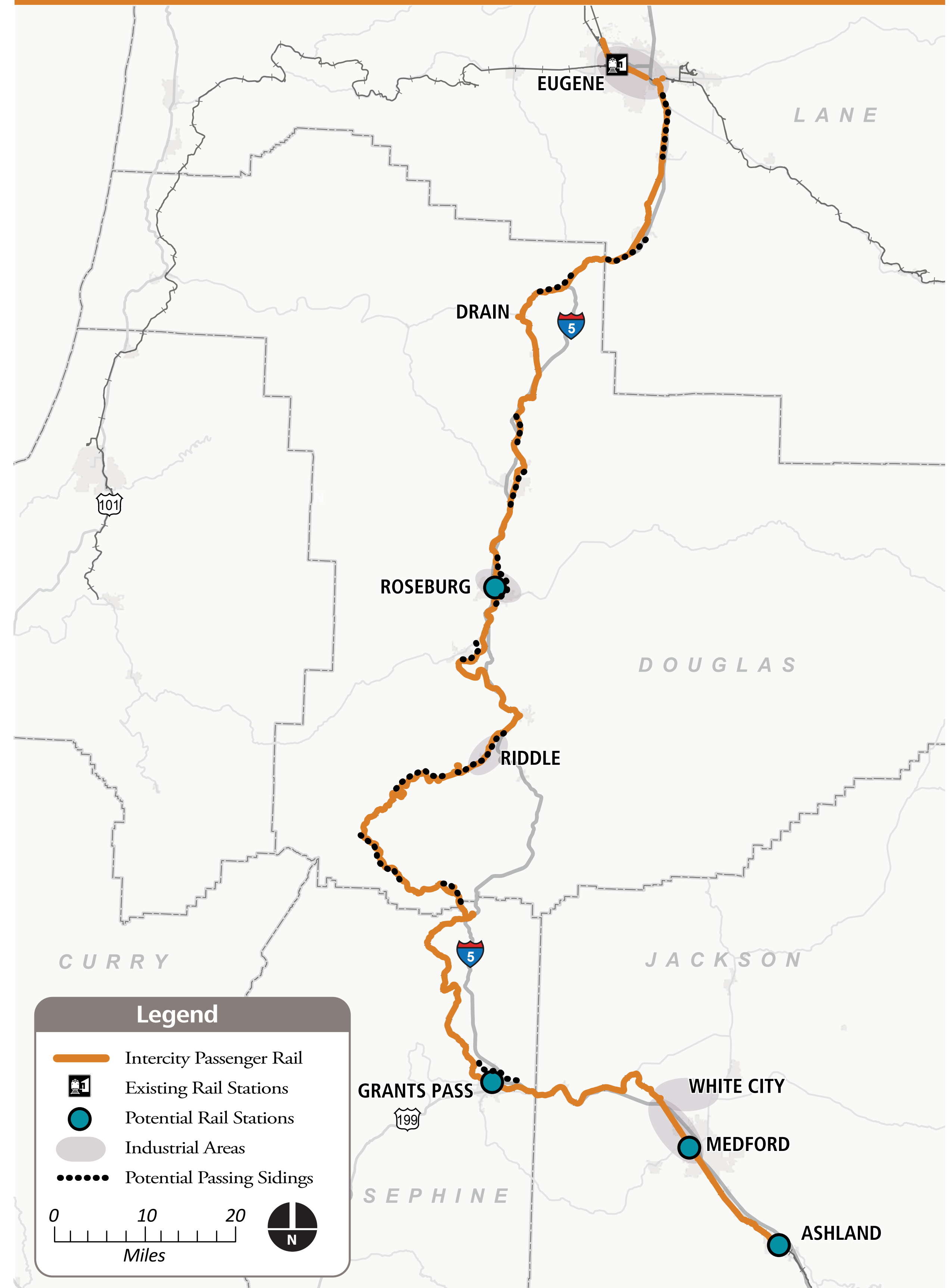
UPRR would need to be part of all future discussions about intercity passenger rail service between Eugene and Ashland, because it owns and operates the track between Eugene and Springfield, a section that is part of UPRR's heavily used freight corridor. While there has been no request for a formal position from UPRR on passenger rail on its section, UPRR has been briefed and has not expressed any initial opposition to the concept. Future negotiations with UPRR will be essential to provide the capacity necessary for additional passenger operations on this segment of track.

The cost to upgrade the Siskiyou line would be significant due to steep grades and an exceptionally winding alignment. Many trestles and tunnels along the single track carry restrictions, and bridges are in various states of disrepair. The line currently allows 25 mph speeds and extends 221 miles. Nine freight trains per day serve multiple shippers.

The multiple tunnels, bridges, and trestles on the Siskiyou line will eventually require expensive upgrades simply to maintain freight service over the long term (see Chapter 3, Rail Infrastructure). Passenger service would require additional substantial upgrades to those infrastructure components to improve speed, safety, and reliability. Longer sidings and some double-tracking would be needed to ensure the ability to continue serving the freight shippers along the corridor efficiently. The track can be upgraded to host average operating speeds of 50 mph, with a few sections having the ability to achieve a maximum speed of 90 mph.

Two passenger service scenarios were tested. Both included two roundtrips per day between Eugene and Ashland serving stations in Eugene, Roseburg, Grants Pass, Medford, and Ashland. One assumed rebuilding the entire existing line, resulting in an end-to-end running time of approximately five hours. This five-hour scenario estimates 2,300 to 2,700 passengers annually in 2030 and is estimated to cost $2.9 billion or more. The other assumed an end-to-end running time similar to an automobile travel time along I-5, a trip of approximately three hours, which would require major improvements to the existing alignment which have not been identified or priced. The three-hour scenario estimates 4,800 to 5,200 passengers annually in 2030. Figure 5.8 shows the rail alignment between Eugene and Ashland, the potential passenger rail station locations, and locations for potential sidings.

Figure 5.8 Eugene to Ashland Intercity Passenger Rail Study Corridor



Summary of Intercity Passenger Rail Studies

The *OTP* calls for preserving and growing rail capacity and services, including preserving existing rail infrastructure where freight services are economically viable, as well as passenger service through the state. To continue Oregon's efforts to grow passenger rail service, ODOT commissioned a study of existing rail lines between Portland and Ashland.

PORTLAND TO EUGENE

Without capacity improvements, by 2030 travel times for the existing Portland to Eugene intercity service will lengthen to over three hours each way. The number of riders will increase moderately even with no unplanned improvements to the UPRR line after 2010. However, with improvements and increased frequency of service, intercity passenger rail ridership could more than double by 2030.

Where passenger trains travel today (the UPRR line), average speed is 42 mph, on-time performance is 68 percent, and service frequency consists of two Oregon-sponsored Amtrak *Cascades* roundtrips per day between Eugene and Portland. Passenger trains peak at 79 mph. However, this speed is routinely achieved on only seven of the 124 miles between Portland and Eugene. Cost to improve on-time performance, increase frequencies, and reduce trip time are estimated at over $2 billion. UPRR has stated that speeds will continue to be limited to 79 mph.

An alternative alignment for passenger service was studied. This alternative alignment is located on the PNWR's OE line south of Willsburg Junction. The OE alternative would attract more riders, be less expensive to construct, and improve PNWR freight service without risking on-time performance of the passenger trains due to high density freight congestion, which exists on the UPRR line. Freight congestion on the UPRR line will continue to grow as our nation's demand for freight continues to grow with increased population. Freight congestion on the OE line will grow and was studied for the year 2030 but is not projected to be at volumes that will inhibit higher-speed, reliable, and more frequent passenger service. The OE alternative would improve freight service on both the UPRR line and the OE line.

Electrifying the OE line is technically feasible. Traditional sources of electricity could be used if the OE line operator and owners agree. Solar panels could also supply cleaner energy for intercity service.

At the national level, the federal government has recently awarded funds for investment in the federally designated high-speed rail corridor between Eugene and Vancouver, BC from the HSIPR program. This newly created program is the first federal passenger rail funding program in the US.

Interviews and open house meetings with community stakeholders throughout the corridor have identified opportunities and concerns that must be addressed through a thoughtful and thorough public forum. The next phase to implement higher-speed passenger service in the Willamette Valley will include design, engineering, and environmental studies in conjunction with a public involvement process. These studies will include an Alternatives Analysis to identify Oregon's preferred passenger service route. The studies are a prerequisite to federal funding for major corridor improvements.

EUGENE TO ASHLAND

The many challenges facing implementation of intercity passenger rail between Eugene and Ashland render initiating passenger rail service infeasible at this time. The estimated cost of improvements exceeds $2.9 billion, and the line would likely attract 2,300 to 2,700 passengers per year under the five-hour run time scenario—approximately 35 to 50 passengers per week. The five-hour run time, which is significantly longer than three hours by automobile or four hours by bus, is the primary deterrent to potential passenger rail riders. Under the three-hour run time scenario, ridership is forecasted to range from 4,800 to 5,200 annual riders—approximately 90 to 100 riders per week. A new, faster alignment more competitive with the three-hour auto travel time would increase ridership by 50 percent over the five-hour scenario. However, to achieve the three-hour run time would require significantly more than $2.9 billion in capital investment to straighten the alignment through steep and curvy mountainous terrain.

While I-5 will experience an increase in congestion over the next 20 years, it will not approach the point where the southern corridor experiences congestion levels similar to those currently experienced further north along I-5 in the Willamette Valley. Minimal congestion in the southern I-5 corridor combined with the longer travel time by train makes intercity passenger rail travel between Eugene and Ashland unrealistic before 2030.

CHAPTER 6

Commuter Rail Service

Like intercity passenger rail, commuter rail typically operates over the privately owned freight rail system. It is distinguished from intercity passenger rail by connecting cities within the same metropolitan area during commuting hours. Another difference is when Congress created Amtrak in 1970, it mandated that the freight system must allow Amtrak to operate intercity passenger service on the system, but exempted commuter rail. Therefore, the railroads do not have to accommodate commuter rail service on their lines.

Beginning in the 1890s, commuting by rail throughout Oregon's Willamette Valley was the dominate form of transportation for over 30 years. The first commuter rail-type service was between Lake Oswego and Portland in the 1890s. After the advent of the automobile, commuter rail service began declining in the US. By the end of the 1950s, commuter rail service in Oregon had ceased to exist. Since the 1990s, there have been varying levels of interest in reinstituting commuter rail service in Oregon, and a number of commuter rail studies have been commissioned which are reviewed in this chapter. In the mid-1990s, Washington County and the greater Portland metropolitan area began considering a commuter rail service in suburban Washington County, which culminated with the opening of the WES commuter rail line in early 2009. Today, WES is the only commuter rail service in Oregon.

There has been growing interest in evaluating the feasibility of commuter rail service between Wilsonville and Salem, as an extension of WES. The alignment is shown in Figure 6.1. Such service could divert some of the projected vehicle trips from the state highway system to a parallel rail route. To assess the challenges and opportunities of extending commuter rail from Wilsonville to Salem, a preliminary feasibility study was initiated as a part of the *Oregon Rail Study*. The feasibility study looked at extending service between Wilsonville and Salem along 29 miles of the OE alignment. The study included a review of data from the previous commuter rail studies and an evaluation of the experience of the WES service. The results of those investigations are presented in this chapter.

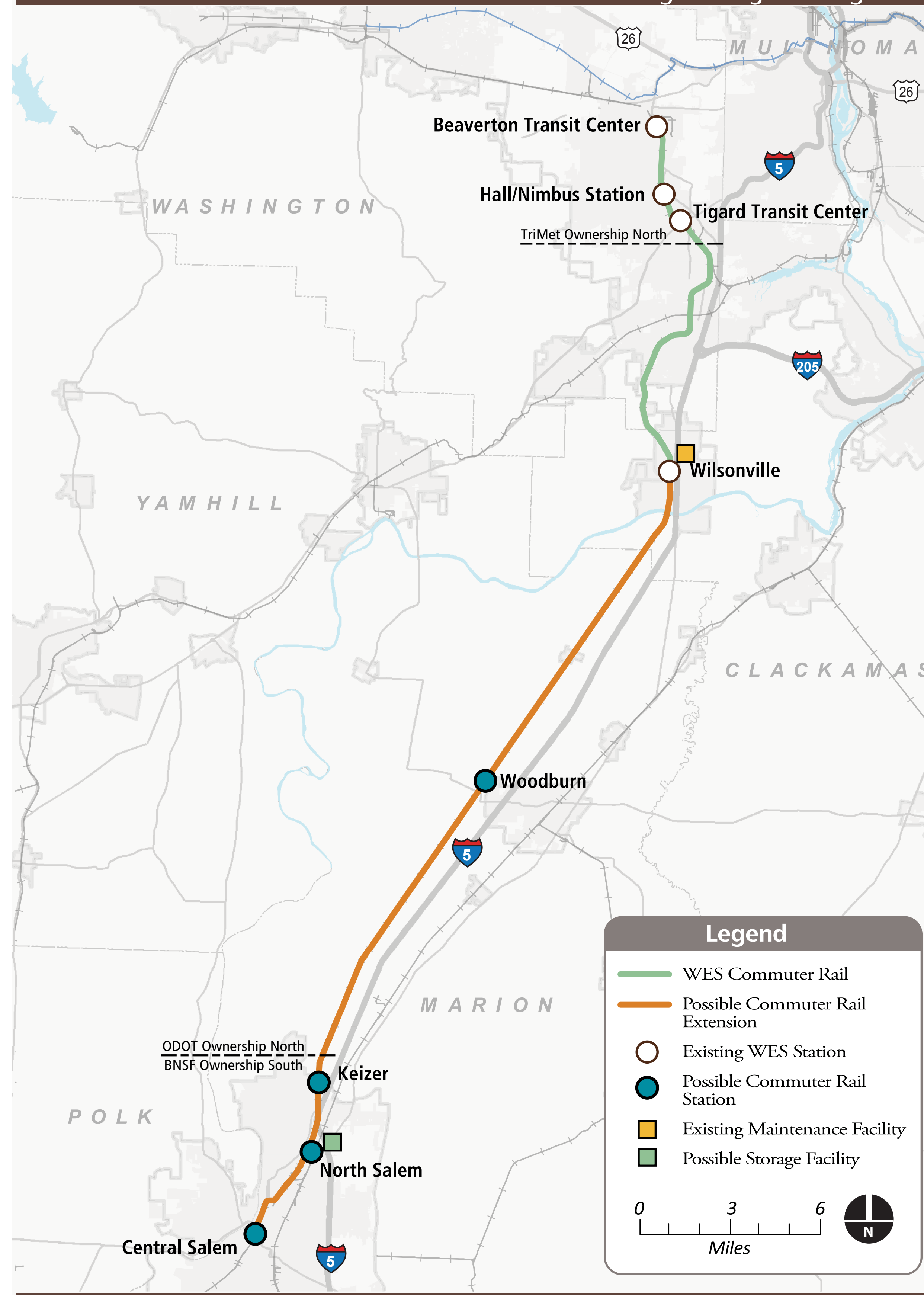
Previous Commuter Rail Studies

ISSUES TO CONSIDER WHEN EVALUATING COMMUTER RAIL

Before evaluating commuter rail between Wilsonville and Salem, the *Oregon Rail Study* looked at previous commuter rail studies to determine what information had already been collected, what gaps in information existed, and what lessons might be learned from the previous analyses.

Six commuter rail studies dating back to 1997 were reviewed. The goal was to create an inventory of what rail data had been collected and what had been omitted, and to develop guidance for what should constitute comprehensive feasibility studies of commuter rail opportunities in the future.

Figure 6.1 Wilsonville to Salem Commuter Rail Study Area Including Existing WES Alignment



The previous six studies had examined the idea of adding commuter rail service to the following four corridors:

- Ashland to Medford, 2001
- Yamhill County to Portland, 1998 and 2008
- Wilsonville to Beaverton, 1997
- Vancouver, WA to Portland, 1999 and 2006

When the content and scope of the six commuter rail studies are compared, it becomes clear that some aspects for evaluating the feasibility of commuter rail are studied frequently, while others are rarely studied. Scant attention was paid to land use issues, cost-benefit analysis, financing, impacts to freight rail operations, and governance issues. Surprisingly, only one of the six studies included outreach to the host railroad, even though no rail service can occur without its agreement. Table 6.1 lists major issues and whether each of the six existing studies evaluated each issue. The comparison reveals the gaps in information or analysis for the four corridors. Future study of commuter rail in these corridors should address these gaps. In addition, the Transportation Research Board[26] has recently completed a "best practices" guide for commuter rail studies, entitled *Guidebook for Implementing Passenger Rail Service on Shared Passenger and Freight Corridors* (2010).

Five aspects of commuter rail should be evaluated in any feasibility analysis in order to obtain a complete picture of the opportunities and constraints. The five critical aspects are: outreach to the railroad owners of the track regarding right-of-way and trackage rights, data collection, operating plan assumptions, data analysis, and feasibility assessment.

OUTREACH TO THE HOST RAILROAD

Commuter rail service typically runs on the same privately owned infrastructure as freight and intercity passenger rail services. Because the railroads have the sole decision-making power regarding the use and operation of their rail corridors, the host railroad should be involved from the beginning of the discussion.

26 The Transportation Research Board is one of six major divisions of the National Research Council—a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. The mission of the Transportation Research Board (TRB) is to promote innovation and progress in transportation through research. http://www.trb.org/AboutTRB/Public/AboutTRB.aspx. Accessed April 26, 2010.

Table 6.1 Issues Addressed in Commuter Rail Studies

	Ashland to Medford 2001	Yamhill County to Portland 1998	Yamhill County to Portland 2008	Wilsonville to Beaverton 1997	Vancouver to Portland 1999	Vancouver to Portland 2006
RAILROAD OUTREACH					•	
DATA COLLECTION						
Line Characteristics	•	•		•	•	•
Land Use Issues	•			•		
Station Location	•	•	•	•	•	
Train Equipment	•	•	•	•	•	
Schedule	•	•	•	•	•	
Ridership Estimates	•	•	•	•	•	
Capacity Analysis				•	•	
Capital Costs	•	•	•	•	•	•
Operating Costs	•	•	•		•	•
FEASIBILITY ASSESSMENT						
Cost-Benefit Analysis/Return on Investment Analysis	•				•	•
Financing Plan						
Governance Issues					•	

DATA COLLECTION

An inventory of the existing condition of the rail line infrastructure and adjacent land uses will help identify potential physical and operational constraints to commuter rail service. For example, the standards for freight track type and condition are different from the standards for passenger rail, and therefore running commuter service could require significant upgrades. An examination of existing and planned land uses will identify potential incompatibility between rail operations and adjacent land use types. Data collection may include analyzing the line characteristics, including the condition of the track, available right-of-way, and physical features such as crossings, bridges, and wetlands that could constrain the ability to expand or improve track capacity. Agencies with jurisdiction over land use should be consulted to determine land use issues, including both opportunities and conflicts that commuter rail service could present.

OPERATING PLAN ASSUMPTIONS

In order to assess the feasibility of commuter rail service, assumptions must be made about station locations, train equipment, and schedule. These factors are used to estimate the number of trains per day and level of service to be used in calculating ridership estimates. Without ridership estimates, it is difficult to assess whether the investment would be justified. The operating plan should identify who will potentially operate the service.

DATA ANALYSIS

A ridership estimate should be calculated using a recognized and commonly used modeling tool. The estimate should identify demand by workday, time of day, origin/destination, parking needs, bus service needs, and diversion from adjacent transportation facilities.

The capacity of the rail alignment must also be analyzed, using either sophisticated rail operations software packages or simpler string-line diagrams. The capacity analysis will identify delays and safety conflicts in the commuter or freight rail systems based on current and future train schedules. The analysis identifies where constraints will likely occur and tests the ability for improvements to overcome delays.

Findings from the capacity analysis are used to design and estimate capital costs for necessary track improvements to reduce delays or add infrastructure for the commuter service. Other capital costs comprise stations, maintenance facilities, and train equipment. Operating costs such as labor, administration, insurance, and maintenance associated with operating the commuter rail service should also be estimated.

FEASIBILITY ASSESSMENT

A cost-benefit analysis or return on investment analysis compares the potential costs, both capital and operational, to the benefits created from the service. Both the costs and the benefits are monetized over the life cycle of the infrastructure investment. Measure of the benefits should include factors such as reduced highway maintenance and construction costs, improved travel time, economic impact, reduced pollution, increased safety, and reduced congestion.

A financing plan should be developed to identify possible funding sources and a strategy for funding both initial and on-going capital and operating costs.

Critical governance and interagency issues should be identified and a plan developed for solving them. Governance identifies which entity would be responsible for project implementation and ongoing operations of the commuter rail line. Interagency issues research includes, for example, resolving permitting and land use compatibility issues with local governments, resolving operating issues with the host railroad, and resolving safety issues with ODOT, the Federal Transit Administration (FTA) or the FRA.

A Case Study: Wilsonville to Salem Commuter Rail Assessment

The *Oregon Rail Study* includes an assessment of extending the existing WES commuter rail service from Wilsonville to Salem. Figure 6.1 shows the study area.

The *Wilsonville to Salem Commuter Rail Assessment*, Appendix I, is a high-level feasibility study that builds on lessons learned from WES and covers the topics previously outlined in this chapter:

- Railroad Outreach
- Data Collection: Line Characteristics, Land Use Issues
- Operating Plan Assumptions: Station Locations, Train Equipment, Schedule
- Data Analysis: Ridership Estimates, Capacity Analysis, Capital Costs, Operating Costs
- Feasibility Assessment: Cost-Benefit Analysis/Return on Investment Analysis, Financing Plan

OUTREACH TO RAILROADS: PNWR AND BNSF

Information provided by the two railroads was used to conduct operating and capacity assessments and to analyze costs for construction, rail operations, maintenance, and insurance.

Three entities have a vested interest along the OE line from Wilsonville to Salem:

- The State of Oregon owns the right-of-way between Wilsonville to just north of Keizer.
- BNSF owns the line from north of Keizer to Salem.
- PNWR owns the operating rights on the ODOT right-of-way and leases the BNSF right-of-way.

Consequently, consent by PNWR and BNSF to allow commuter rail on their systems would be required. Both PNWR and BNSF were interviewed to discuss their willingness to entertain extending commuter rail to Salem. Given the impact on current operations from WES and concern for the future, PNWR does not support expansion of WES on its system.

BNSF representatives were asked about the concept of a commuter rail extension to Salem, their experience with other commuter rail projects, and how commuter rail would be different from intercity passenger rail. Some of the key responses included the importance of developing a potential commuter rail operating plan early in the project planning process, because frequency and bi-directional operation significantly affect infrastructure plans and double tracking needs, resulting in significant impacts to capital costs. BNSF representatives confirmed that passenger trains require careful planning and capacity improvements to ensure that freight trains can adequately navigate the corridor. In addition, BNSF would require indemnification similar to that already in place for PNWR for WES. BNSF also expressed a possible willingness to sell the corridor at market value, which would likely reduce or eliminate the requirement to indemnify BNSF against potential liability.

DATA COLLECTION

Information collected to document existing conditions within the study area between Wilsonville and Salem included the following:

- Railroad track charts showing infrastructure and the extent of right-of-way
- Population and employment statistics
- Freight operations (number of trains, running speeds, switching times)
- Site reconnaissance at potential station locations
- Land use plans from jurisdictions along the alignment
- Maps and aerial photos
- Commuter rail data from Washington County and TriMet
- Ridership data from a variety of sources

FREIGHT RAIL OPERATIONS

Currently, PNWR operates an average of two northbound and two southbound freight trains per day in the study corridor, but at times PNWR operates as many as four freight trains in each direction each day. Freight trains average 25 mph along the corridor. PNWR performs switching operations at a number of locations between Wilsonville and Salem: Hopmere, west Woodburn, and north Salem being the most frequent locations. By 2030, the number of freight trains is expected to double.

PNWR indicates that it has reduced or eliminated freight service during the morning and afternoon weekday peak periods in the current WES corridor, and has curtailed midday service as well, in order to provide capacity for commuter rail service. Track conditions along the alignment between the WES terminus in Wilsonville and Salem are adequate to serve its current purpose as a low-density freight railroad, but the track would need to be rebuilt to support passenger rail service.

LAND USES

Wilsonville station is the current southern terminus of WES commuter rail and the starting point of the extension studied in this assessment (see Figure 6.1). The existing OE rail line between Wilsonville and Salem passes through diverse land uses. At Wilsonville, land is industrial in one area and farm (urban holding) in another. Outside the commercial and single-family residences in communities such as Donald, Woodburn, Hopmere, and Keizer, land is zoned mostly for farm uses. Land is mostly industrial at the north end of Salem, and then there is a mix of uses, urban densities, and existing transit services to the larger downtown area of Salem.

A previous study suggested that the initial phase of the commuter rail extension should terminate at Keizer or north Salem because of the land use impacts of extending commuter rail through north and central Salem.[27] Although terminating the extension in north Salem would reduce immediate impacts to adjacent communities and relieve some design issues, it would force the majority of Salem-bound riders to transfer to another transit mode before reaching central Salem's employment and commercial core and would likely reduce ridership.

Through Salem, the current alignment passes near a number of pedestrian areas, schools, parks, and office parks. Planning for increased rail service near any of these existing uses requires sensitivity to neighborhood and community needs and safety, an issue which would need to be addressed in the Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) process. Mitigation measures would need to be developed to address the pedestrian and community impacts that would result from the commuter rail extension.

LINE CHARACTERISTICS

The alignment from Wilsonville station to Salem could support passenger train speeds up to 110 mph, if the track is rebuilt, except where curvature requires reduced speeds. The existing right-of-way is large enough for two mainline tracks. A few locations where there is fewer than 50 feet of right-of-way may require that the existing track be shifted to accommodate a second track for commuter rail operations. Figure 6.2 describes some of the line characteristics along the alignment.

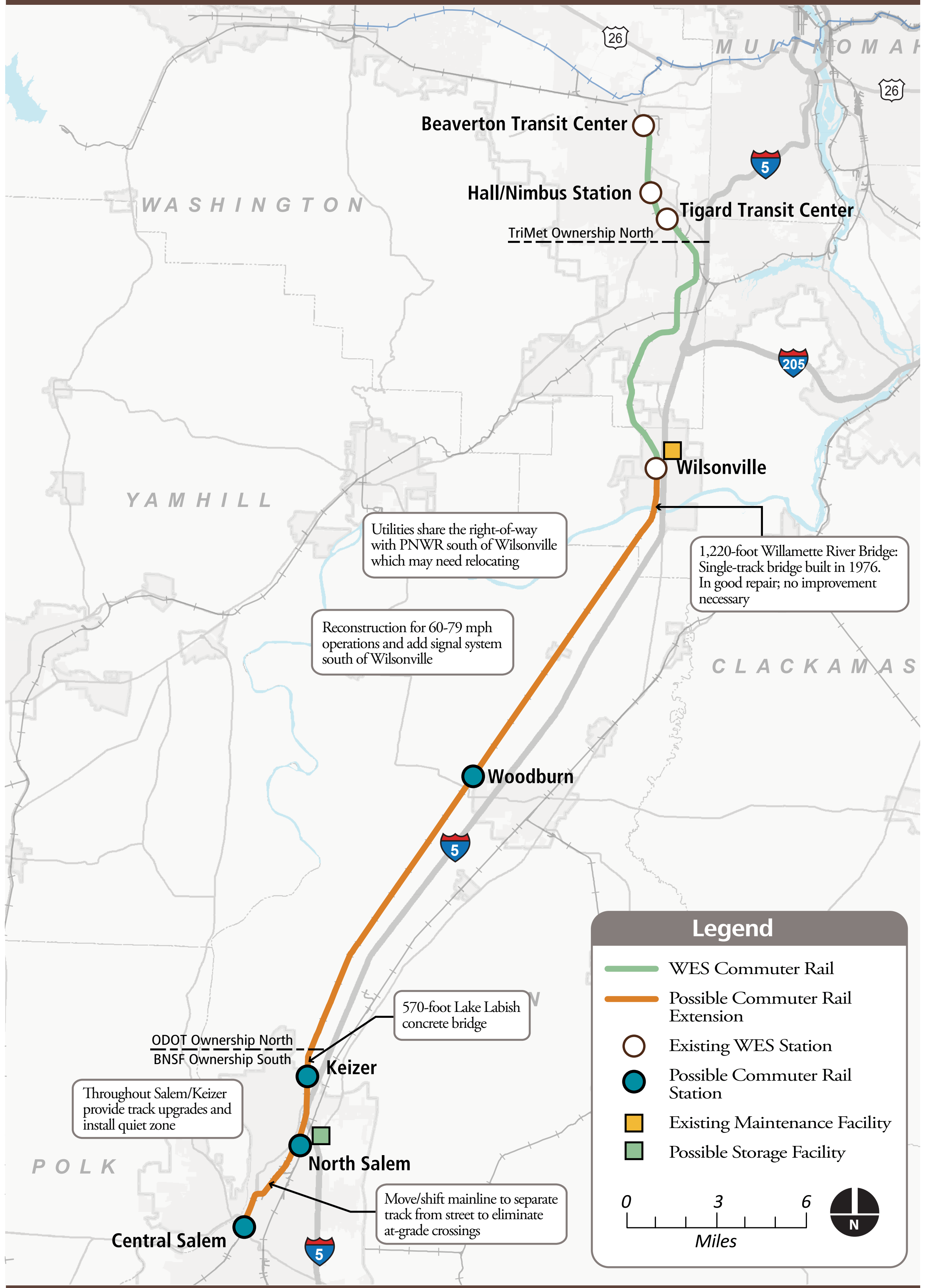
Both buried and overhead utilities are located within the right-of-way in the Wilsonville city limits and at other locations along the corridor. Utilities may need to be relocated to accommodate additional track.

The single-track Willamette River Bridge near Wilsonville was built in 1976 and is in good condition. This study assumes the bridge would remain as a single track. The alignment also crosses the 570-foot Lake Labish concrete bridge upon entering Keizer city limits.

Track through north Salem is located within Front Street with limited separation from vehicular and pedestrian traffic, and there are several at-grade crossings. Improving speed would require a shift of the mainline to separate the railroad track from the street and to eliminate conflicts between different uses at intersections. Speeds through Salem would be limited to less than 40 mph, and a quiet zone would help reduce impacts on adjacent neighborhoods.

27 *Commuter Rail Feasibility Between Wilsonville and Salem/Keizer* (Powerpoint presentation), HDR, Inc., 2009.

Figure 6.2 Existing Conditions and Identified Track and Operations Issues



TRANSIT FACILITIES AND SERVICES

Many of the communities along the OE line are served by transit services that have facilities near the alignment. They include the transit transfer station and the park-and-ride lot at the Wilsonville station where transfers between WES, all South Metro Area Regional Transit (SMART) buses, Salem-Keizer Transit (Cherriots) buses, and Canby Area Transit (CAT) buses occur.

OPERATING PLAN ASSUMPTIONS

Developing an operating plan was an essential part of the feasibility study. Assumptions were made about the alignment, schedule, train equipment, station locations, terminus, and maintenance facilities. A detailed summary of the operating assumptions, including schedules and capacity analysis, can be found in the Wilsonville to Salem Commuter Rail Assessment, located in Appendix I.

STATION LOCATIONS

Stations were assumed to be at Wilsonville, Woodburn, Keizer, and Salem. Three options for a southern station terminus were studied: Keizer, north Salem, and central Salem. Current and projected commute trip patterns in the Salem/Keizer metropolitan area and the distances between stations suggest that a north Salem terminus would eliminate the need for a Keizer station. If the extension terminates in central Salem, a Keizer station would replace a north Salem station. Station areas are discussed in detail in Appendix I.

WES at the Wilsonville station.

TRAIN EQUIPMENT

The current WES equipment, three Diesel Multiple Units (DMUs) and one unpowered trailer car, would not be sufficient to maintain the current service and add service to Salem. The number of train sets depends upon the schedule. Service every 30 minutes would require five additional train sets; service every 60 minutes would require four additional train sets.

WES currently uses DMUs built by Colorado Railcar, which went out of business during the train car delivery for WES. In 2009, US Railcar purchased Colorado Railcar's assets with plans to manufacture DMUs in the US. Potential vendors would likely be able to match specifications of the existing WES trains, but the cost would be highly dependent on finding partner commuter operations to bid jointly on engineering and construction of components. New equipment that would maintain the look and feel of existing WES trains for the extension is desirable for operational continuity. Equipment options would be analyzed during the project design process in an equipment procurement plan.

Another option would be locomotive-hauled train sets. There are several manufacturers in the country as well as potential partner agencies such as Sound Transit in Seattle, Utah Transit Authority, and Trinity Rail Express in the Fort Worth-Dallas area for these train sets. Using such equipment would require modifying the WES line to have a stronger Beaverton Creek bridge at Beaverton Transit Center as well as enlarging existing WES station platforms. The changes would have a significant impact on overall costs.

SCHEDULE

Six operating scenarios were studied to capture the impacts of different combinations of commuter train frequency, Amtrak train frequency, and freight train frequency. The analysis assumed that WES would keep the existing schedule of trains every 30 minutes in the morning and evening peak periods. All scenarios include hourly midday service, which would be in addition to the current WES schedule. Other scenarios could be developed to reduce capital and operating costs (compared to 30-minute service along the entire corridor) without substantially reducing ridership. Analysis of those scenarios would be appropriate during the environmental review and preliminary engineering analysis that would be required.

DATA ANALYSIS

The service level analysis assumed that WES would keep the existing schedule of trains every 30 minutes (also referred to as a 30-minute headway) in the morning and evening peak periods. Hourly midday service would be added as an option. A 60-minute service assumption was also added. The 30- and 60-minute headway assumptions combined with two options of the line ending at Keizer/north Salem or downtown Salem, and the midday service resulted in a total of six scenarios:

1. 30 minute service, terminating in central Salem, no midday service
2. 30 minute service, terminating in north Salem or Keizer, no midday service
3. 60 minute service, terminating in central Salem, no midday service
4. 30 minute service, terminating in central Salem
5. 60 minute service, terminating in central Salem
6. 60 minute service, terminating in north Salem or Keizer

The six future scenarios were analyzed for ridership forecasts, capacity, capital requirements, and operational costs. A sketch-planning model was developed to create order-of-magnitude ridership comparisons for different scenarios, because no existing computer model can provide ridership forecasts for the entire study area.[28]

FORECASTED RIDERSHIP

The daily ridership projections under these various scenarios are shown in Table 6.2.

Table 6.2 Daily Ridership Projections by Scenario, Wilsonville to Salem[29]

Scenario	Wilsonville-to-Salem Headway	Southern Terminus	Midday Service	Projected Ridership 2020	Projected Ridership 2030
1	30 minutes	Central Salem	No	2,920-3,570	3,240-3,960
2	30 minutes	North Salem or Keizer	No	2,190-2,670	2,430-2,970
3	60 Minutes	Central Salem	No	2,630-3,210	2,910-3,560
4	30 Minutes	Central Salem	Yes	3,440-4,210	3,820-4,670
5	60 minutes	Central Station	Yes	3,100-3,790	3,440-4,200
6	60 minutes	North Salem or Keizer	Yes	2,320-2,840	2,580-3,150

28 Note: It is likely that FTA will require a formal travel demand forecasting model be developed for use in the AA/DEIS process. This model would need to be capable of producing FTA-compliant travel user benefit output.

29 Existing ridership is estimated at 600 riders per day. Combination of ridership on the SMART/Cherriots 1X route, as reported by SMART (approximately 400 to 500 riders per day), plus an estimate of vanpools operating in the corridor. If adjusted for economic conditions, this is estimated to be approximately 700 bus/vanpool riders per day.

To check the accuracy of the analysis, the results were compared to previous commuter rail studies for the Wilsonville to Salem corridor. The results of the ridership forecast fall within the range of projections developed for prior studies by TriMet and Metro, as shown in Table 6.3.

Table 6.3 Ridership Projections Comparison, Wilsonville to Salem

Source	Current Feasibility Assessment[30]	Metro[31]	TriMet/URS[32]	TriMet/HDR[33]	Average
2020 Ridership	2,920 – 3,570	3,900	3,000 - 3,600[34]	2,500 – 3,800	Approx. 3,400

CAPACITY ANALYSIS

Capacity would need to be expanded if commuter rail service were added to the OE line. Additional passing sidings and/or double tracking would be needed at multiple locations to allow freight and commuter trains to pass each other. PNWR indicated all schedule scenarios would require a second track along the existing WES corridor between Tualatin and Wilsonville. The addition of this second track would mitigate current freight operational issues that PNWR is experiencing and would help overcome expected capacity constraints if intercity passenger service (Amtrak) were shifted to the OE line. Maintaining access to PNWR's industrial customers would require construction of two to four passing sidings under the 60-minute and 30-minute scenarios, respectively.

CAPITAL COSTS

Major cost elements for the extension include the following:

- Train equipment
- Stations at Woodburn, Keizer, and Salem
- Maintenance and support facilities
- Signals/communications and crossings warning upgrades
- Track upgrade and/or replacement
- Passing sidings and double track
- Implementing a "quiet zone" through Salem

Acquiring the BNSF right-of-way and upgrading the Willamette River Bridge on the OE line for faster, passenger train operation were not included in the cost estimates.

30 Assumes service terminates in central Salem.
31 Estimates based between Beaverton and Salem.
32 Estimate extrapolated to 2020. Assumes service terminates in central Salem.
33 Assumed service terminates in north Salem.
34 Estimate extrapolated to 2020 based on URS 2015 projections.

Contingency costs were added for administration of an FTA grant, multiple agency agreements and funding, and construction of improvements under rail traffic.

WES costs were approximately $11 million per mile (all costs included). The cost estimates for the commuter rail extension range from $11.3 million to $13.3 million per mile, of which approximately $1.0 million to $1.5 million per mile is due to mitigation measures along the existing WES corridor. The conceptual capital cost estimates provided in Table 6.4 include costs for two scenarios, 60-minute service and 30-minute service, both to central Salem.

Table 6.4 Conceptual Capital Cost Estimate

Cost Element (Rail Assumptions)	Unit Costs (per mile or per each)	60-Minute Scenario	30-Minute Scenario
Track: new with subgrade, welded rail, concrete ties, and new turnouts Sidings: assume 3-5 miles of sidings along the 30-mile corridor, plus 3 to 5 miles for a double track between Tualatin and Wilsonville, depending on operating scenario	$2,500,000	$15,000,000	$25,000,000
Track: replace/upgrade to as much as 79 mph (FRA Class 4)	$1,000,000	$30,000,000	$30,000,000
Track: replace ties for track upgrades	$500,000	$15,000,000	$15,000,000
Double crossovers (one on the double track)	$2,000,000	$2,000,000	$2,000,000
Stations (Woodburn, Keizer, Salem)	$5,000,000	$15,000,000	$15,000,000
Signals & communications (excludes crossings)	$1,000,000	$25,000,000	$25,000,000
Maintenance, storage, and support facilities	$10,000,000	$8,000,000	$10,000,000
Crossings: all public crossings, including signal upgrade	$400,000	$12,000,000	$12,000,000
Bridges: replace timber with concrete	$4,800	$24,000,000	$24,000,000
Equipment	$5,000,000 - $6,000,000	$30,000,000	$50,000,000
SUBTOTAL		$176,000,000	$208,000,000
Preliminary Engineering and Permitting Services (13 percent)		$22,880,000	$27,040,000
Construction Engineering (8 percent)		$14,080,000	$16,640,000
Contingency (50 percent)[35]		$88,000,000	$104,000,000
FTA/Multi-Agency Administration (15 percent)		$26,400,000	$31,200,000
TOTAL		$327,360,000	$386,880,000

35 Accounts for design components not readily identified at this level of detail, as well as for estimated right-of-way acquisition. Also includes costs for establishing a quiet zone through Salem.

OPERATING COSTS

Conceptual operating costs based on information from TriMet and other recent similar commuter rail projects are shown in Table 6.5.

Table 6.5 Conceptual Annual Operating Cost Estimates

Operational Element	Estimate for Wilsonville to Salem Commuter Rail Extension
Transit Agency Staff	$400,000 – $500,000
Railroad Maintenance Work and Support Staff	$1,750,000 – $2,250,000
Commuter Train Operations	$1,400,000 – $1,700,000
Performance Incentive (for on-time performance by PNWR crews)	Not included in this assumption
Insurance	$2,000,000 – $2,500,000[36]
TOTAL	$5,550,000 – $6,950,000

FEASIBILITY ASSESSMENT

Assessing the feasibility of extending the WES commuter rail service from Wilsonville to Salem must consider the costs and benefits of the extension; environmental impacts, right-of-way and land use impacts; capacity for freight and passenger rail traffic; sources of financing; and governance issues. The findings are intended to assist elected officials and stakeholders to determine whether the Wilsonville to Salem extension concept should be advanced further.

COST-BENEFIT ANALYSIS/RETURN ON INVESTMENT ANALYSIS

The preliminary analysis indicates that the overall travel improvements on I-5 and OR 99E and OR 99W as a result of the extension would be very limited. Wilsonville to Salem commuter service is projected to reduce congestion up to three percent on I-5 during the morning and evening peak commuting periods between 2015 and 2030. More of the benefit could be realized on OR 99E and OR 99W than on I-5. Since OR 99E and OR 99W provide similar access to regional destinations and also have congestion during peak travel times, trips on those routes may shift to I-5 to take advantage of the reduced congestion. The study area would need to be more thoroughly evaluated to quantify reduced travel delays compared to not extending the commuter service.

The extension would create more choice for people who do not have access to private vehicles for transportation and who would use the transit systems that would connect with the commuter rail stations. The mobility of transit-dependent individuals is a primary variable used by the FTA in evaluating proposed transit projects for funding.

36 This cost is estimated at approximately half of the totaled other operational costs. TriMet assumes a lower marginal increase over current rate.

FINANCING PLAN

Consultation with the railroads, TriMet, and Washington County revealed that creative funding solutions and a political champion would be essential to funding the extension locally and successfully presenting the proposal to the FTA. For reference, the WES line was funded by the State of Oregon (~25 percent), Washington County and local cities (~20 percent), TriMet (~five percent), and FTA (~40 percent).

Since the FRA does not offer grants for public transit investments, the most likely source of federal funding would be FTA. To qualify for FTA funding, lead agencies need to show that financial backing is in place and that the proposed investment demonstrates a balance between forecasted ridership and total construction and operational costs. No state or local funding source has been identified to date. Requests for FTA funding compete on a national scale using the FTA's New Starts criteria.

GOVERNANCE ISSUES

Extension of the WES commuter rail line to Salem would involve many jurisdictions, including the State of Oregon; Washington, Marion and Clackamas counties; the cities of Wilsonville, Woodburn, Keizer and Salem; the PNWR and BNSF railroads; and the transit agencies throughout the corridor—TriMet, SMART, CAT, and Cherriots. These agencies would need to work together to implement the extension. One of the lessons from WES was that successful implementation of the new commuter rail service was the result of visible and consistent local champions throughout the planning and construction of the project. A similar coalition of proponents from the Wilsonville to Salem area local agencies has not yet emerged.

Given that the extension to Salem would cross multiple jurisdictions, the options considered for a governing agency include:

1. A single transit agency (such as TriMet) with operating agreements with other agencies outside of the established district. TriMet has indicated it would not want to administer a commuter rail extension into Salem, another agency would need to be identified.
2. A new regional transit agency. A new, regional entity to oversee the project development, administer funding, and eventually own and operate the system. Multiple agencies would need to participate.
3. Amtrak. Amtrak's statutory authority pertains only to its interstate network, meaning commuter rail would not have the same priority rights as intercity rail. Amtrak can serve as a commuter rail operator, but cannot provide government oversight.
4. ODOT or another state agency. A number of state departments of transportation around the country fund or operate commuter rail systems. Oregon's lack of a state transit funding source currently make this governance option infeasible.

Summary of Commuter Rail Studies

Since 1997, six studies have examined the idea of adding commuter rail service to the following four corridors:

- Ashland to Medford, 2001
- Yamhill County to Portland, 1998 and 2008
- Wilsonville to Beaverton, 1997
- Vancouver, WA to Portland, 1999 and 2006

Five aspects of commuter rail should be evaluated in any feasibility analysis in order to obtain a complete picture of the opportunities and constraints. The critical aspects are: outreach to the railroad owners of the track regarding right-of-way and trackage rights, data collection, operating plan assumptions, data analysis, and feasibility assessment.

These study aspects were included in the *Oregon Rail Study's* assessment of extending the existing commuter rail service from Wilsonville to Salem. The assessment revealed that extending commuter rail to Salem is technically feasible, but it faces operational and financial challenges including:

- Lack of support by PNWR, the operating railroad, because of concerns over freight capacity
- The capital cost of $327 to $387 million and operating costs of $5.5 million to $6.9 million plus per year, however, no funding source has been identified
- The extension project has the potential to attract 3,000 to 4,000 riders per day by 2030, which would slightly reduce congestion on I-5 and OR 99E between Wilsonville and Salem, but not enough to reduce the need for highway capacity projects in the same area
- Need for local political champions of the project
- Ridership on the extension is forecast to be moderate at best when compared to other commuter rail projects nationwide, making funding through FTA more difficult
- Funding sources from local communities would be needed in any matching grant pursuit with FTA, however, none are known to be available
- Existing and planned land uses around some of the possible station locations do not complement commuter rail transit, and possible land use changes to complement commuter rail transit may be incompatible with existing freight rail operations and freight customers along the PNWR line

As population and road congestion are projected to grow, state and local leaders are interested in commuter rail as a piece of the transportation solution. Future studies could focus on the recommended study aspects in varying degrees of depth. Though not every study may cover all aspects due to cost or time constraints, railroad outreach should always be considered. Without the cooperation of the railroad, commuter projects on existing freight rail lines are not possible.

Land Use Impacts

Many Oregon communities were settled along the state's rail lines, most of which remain in operation today. Oregon's rail network was essential to the development of the state's economy and continues to serve the growing demand for freight and passenger service. The chapters on the Freight Rail Industry and Intercity Passenger Rail Service have identified how much the demand for rail service is predicted to grow. That demand will be primarily accommodated by increasing the number and length of trains on the existing rail network. The increase in the frequency of trains will present benefits and challenges for rail carriers and the communities along the rail corridors. Careful community planning must be undertaken to avoid creating new conflicts or exacerbating existing conflicts between heavy rail and neighborhoods. The common conflicts between rail and adjacent land uses can be grouped under three issue areas: the impacts of increased train frequency on communities, the ability of shippers to gain access to rail service, and the impacts on the freight rail lines and services from passenger rail.

Impacts of Increased Train Frequency

Some of Oregon's shortline railroad lines have little traffic, while others have very robust operations. The intensity of rail operations on any given line can ebb and flow with changing market conditions. The changing intensity of rail operations in any community impacts all adjacent uses, whether they are residential, commercial, or industrial. Experience has shown that residents and business owners along inactive or infrequently used rail lines tend to forget that the rail line is there. When activity on one of these lines increases, conflicts often occur between rail operations and neighbors that are sensitive to additional train noise, vibrations, and real or perceived safety risks.

The implementation of the WES commuter rail service between Beaverton and Wilsonville, in February 2009, serves an example of the potential effects of increased rail service on neighboring communities,[37] see Appendix I for more detail. Even though the line was originally built and used to host frequent passenger service, 28 trains a day in 1914, train frequency on the line had fallen over the years. Since the passenger rail operation ceased in 1932, freight train frequencies have averaged two to six trains per day. When WES began in 2009, it added 32 daily passenger trains and brought 32 new horn blows at each at-grade railroad crossing, which were particularly bothersome to citizens during the early morning commute hours. The surrounding communities voiced their concerns and the City of Tualatin is working with TriMet on measures to establish a quiet zone in the city.[38, 39]

Careful siting of residential and commercial zones can help prevent conflicts with existing or future rail services. It is important that communities identify active or inactive rail facilities and take them into account when developing their long-term plans. ODOT's

37 *WES Train Horn Wake-up Call Unwelcome in Tualatin,* OregonLive.com, accessed December 6, 2009. http://www.oregonlive.com/washingtoncounty/index.ssf/2009/02/wes_horns_blasting_tualatin_re.html
38 *Train Horn Rulemaking,* Federal Railroad Administration, 2003, accessed December 6, 2009. http://www.fra.dot.gov/us/content/95
39 *Quiet Zone Project Updates,* City of Tualatin Oregon, 2009, accessed December 6, 2009. http://www.ci.tualatin.or.us/departments/communitydevelopment/planning/CommuterRail.cfm

Transportation System Planning Guidelines[40] suggest that corridor plans and transportation system plans (TSPs) include the following for each rail facility located in or passing through a community:

- Owner/operator of the rail line
- General description and location of rail line and facilities
- Class of track (based on allowable speed)
- Number of trains per day and speed
- Inventory of crossings
- Accident history
- Possible crossing consolidations
- Potential grade separations and closures
- Crossing signals, active or passive
- Existing and potential interconnections with traffic signals
- Future potential for passenger rail service[41]

Most of this information can be obtained through the ODOT Rail Division. See Appendix K for railroad contact information.

TSPs and other long-term planning documents should incorporate the railroads' future visions and plans for the rail corridor, including planned infrastructure expansions, such as the installation of double-tracking or construction of maintenance facilities. Since railroads control the right-of-way, service can change with little or no warning. In the absence of information from the railroads, local communities should assume that rail service will increase on all existing tracks.

How to Obtain Rail Service for Industry

Sometimes prospective shippers and planners assume that rail service is available as long as the infrastructure is adjacent to an industrial site. However, railroads do not automatically grant access, and they scrutinize requests for service whether to new or existing businesses. A railroad may review the site's infrastructure, the proposed operations, the market, the density of traffic on the line, shipper volumes, and the potential revenue of the prospective cargo.

The Class I railroad companies have different requirements for shippers than the more local shortline railroads. Before granting new rail access, Class I railroads undertake a fairly lengthy internal approval process, which is described on their websites.[42] Preliminary engineering must be completed at the 30 percent design level. Several departments within the railroad review the conceptual design documents, a process which can take six months to a year to complete. Class I railroads require facilities that

40 http://www.oregon.gov/ODOT/TD/TP/docs/publications/TSP/Guidelines.pdf
41 *Transportation System Planning Guidelines*, 2008 Appendix 16: Guidelines for Addressing Rail in Corridor Plans and Transportation System Plans, ODOT Transportation Development Division, 2008, accessed September 16, 2009. http://www.oregon.gov/ODOT/TD/TP/docs/publications/TSP/Appendix.pdf
42 Union Pacific Railroad web site provides descriptions of their procedures and requirements for determining access to their line at: http://www.uprr.com/customers/ind-dev/index.shtml

allow for delivery of loads and empty cars simultaneously. If a site lacks a rail spur, the business must build one alongside the Class I mainline nearest the shipper with a typical minimum length of 7,000 feet. To meet operational requirements, Class I railroads employ two types of crews. Mainline crews deliver trains between originations and destinations. Local crews break down trains and deliver the rail cars to individual receivers. To obtain rail service, a business must locate where the local crews operate, have enough volume to justify the railroad's cost of an additional crew and locomotive, demonstrate that stopping to pick up or drop off cars would not negatively impact long-distance train operations and on-time delivery, or have enough room to receive an entire train with a mainline crew.

Shortline railroads have generally taken an aggressive view of providing rail service as long as it can be provided economically. Prohibitive costs are almost always driven by issues with the potential industrial site such as major road crossings, wetland fill challenges, or major earth works rather than specific railroad requirements. Shortlines require siding and yard capacity to be able to handle additional business, but they generally run shorter trains than Class I railroads so sidings do not have to be as long, nor do they always require the expensive electronically controlled switches.

Shortline crews are usually local, allowing them to service any location on their railroad where the appropriate infrastructure is in place. Local staff can evaluate and approve rail access applications much more quickly than the Class I railroads.

Although the shortline railroad is the primary contact in terms of operations and infrastructure, the connecting Class I carrier often has responsibility for pricing any new service since it will carry the freight over the long-haul portion of the corridor. In some cases, the business desiring service may work with the Class I carrier directly.

Obtaining rail service requires early contact with the rail operators to determine the feasibility. The following case studies show two approaches to acquiring rail access. The first case study illustrates a proactive regional approach employed by the Central Oregon Area Commission on Transportation (COACT) to determine how best to support rail freight industries and rail operations between Madras, Prineville, Redmond, Bend and La Pine in central Oregon. The second example is a site-specific look at an unsuccessful attempt to secure rail service for a proposed soft drink bottling plant in Albany, where rail access anticipated by the developer was not granted. These examples demonstrate the importance of including rail operators in discussions about rail service.

STUDY OF ECONOMIC OPPORTUNITIES – RAIL ACCESSIBLE LAND SUPPLY IN CENTRAL OREGON[43]

In 2009, COACT studied regional economic opportunities between Madras, Prineville, Redmond, Bend, and La Pine, with a focus on rail-accessible lands. The COACT Rail Committee was composed of representatives of the COP, ODOT (including the Highway and Rail divisions), Oregon Department of Land Conservation and Development, and planning staff from the counties and cities. The study reviewed the economic development potential that could be achieved in central Oregon with existing regional rail assets. The study also inventoried industrial lands adjacent to rail lines and screened industrial parcels to determine which could make the best use of rail service.

The effort was unique in its level of technical accuracy and its regional context for railroad service. Stakeholders worked directly with the Class I and shortline railroads serving the region to identify operational efficiencies for both shippers and rail carriers, while also enhancing safety and access to rail lines. Including the railroads in the information-gathering effort enabled the planners to target specific properties for rail service and to support rail freight industries and rail operations. The collaborative planning effort provided decision-makers with a solid understanding of where and how investment in regionally significant transportation infrastructure could best benefit the region, as well as position the region to maintain its rail service in the future.

PEPSICO – ALBANY, OREGON

In 2006, PepsiCo signed a development agreement with the City of Albany to develop a manufacturing and bottling plant adjacent to the UPRR mainline that runs through the city.[44] PepsiCo assumed that rail access and service would be granted by UPRR since the property is contiguous to the UPRR track and existing site plans had a rail spur.

Upon contacting UPRR after the purchase agreement was signed, PepsiCo discovered that rail service was contingent on construction of a siding along the mainline track, which would require purchasing additional right-of-way. PepsiCo investigated several other options for gaining access to UPRR's operations, including construction of a rail segment to access service by the AERC shortline, which might have provided more service flexibility than UPRR.

Ultimately, PepsiCo chose not to pursue development at this location. Interviews with the City of Albany revealed that PepsiCo's decision stemmed from the economic downturn and the cost-prohibitive improvements needed to obtain rail access.

These two examples illustrate how different approaches to planning for rail service can influence the outcome. A regional approach to identifying rail-accessible sites may be best for optimizing rail service planning and preserving industrial land, but there will always be site-specific requests. Clearly, proposals should be discussed with railroad operators before much money, time, and effort has been invested.

43 *Study of Economic Opportunities Rail Accessible Land Supply in Central Oregon*, prepared by Tangent Services, Inc., Central Oregon Advisory Committee on Transportation, 2009. http://www.oregon.gov/ODOT/HWY/REGION4/Central_Oregon_Rail_Plan/Central_Oregon_Rail_Economic_Opportunities.pdf

44 *Government Partners Sign Development Agreement with Pepsi*, City of Albany Oregon, October 30, 2006. http://www.cityofalbany.net/services/news_releases/show_item.php?id=580

Impacts of Passenger Rail Related Development on Freight Rail Service

The comprehensive plans for some communities include passenger rail services or transit services on existing freight rail corridors. Part of planning for future passenger rail is identifying conceptual station locations and implementing zoning for the densities and types of uses that will support transit use. The station areas have characteristics that are often referred to as Transit-Oriented Development, or TOD. The intent of TOD is to develop compact, mixed uses that encourage transit ridership and pedestrian-friendly neighborhoods. Successful implementation depends on dense development around transit stations. When such residential and commercial uses are introduced at station areas along freight rail corridors, industrial areas and freight rail operators can be adversely affected. Consequently, TOD may not easily integrate with the needs and uses of successful freight rail corridors, and the impacts of station-area development on freight railroads are important for planners to understand.

The City of Woodburn's comprehensive plan provides an example of the way in which comprehensive planning can affect industrial zones and freight rail service. In 2005, the city expanded the urban growth boundary (UGB) and applied low-density residential zoning to land abutting a segment of the PNWR rail line.[45] The City of Woodburn's transportation plan suggests locating a commuter rail station within the UGB.[46] Several freight rail customers use this segment of the line, including the suggested station location. If the land is developed as planned, an existing rail-served industry will be displaced. Relocation risks losing jobs in the community, since sites that are already served by rail are not common and creating new sites can be difficult precisely because of the land use compatibility impacts discussed previously in this chapter. Further, applying the low-density residential zoning causes all of the industrial land uses to be out of conformance with the zoning code. Expansion and/or redevelopment of nonconforming uses are typically restricted by zoning codes. Consequently, those businesses will be limited in their ability to physically expand or redevelop their sites or other industrial uses, and future financing may be affected. If rail-served industry moves, the health of the shortline railroad could be at risk, and thus affect the local and state economy.

The potential for land development or transit-related use of rail to affect freight operations and adjacent industries is clear. With passenger rail increasingly seen as a key program to alleviate environmental and transportation problems, it is not surprising that freight rail operators are increasingly concerned about the compatibility of adjacent development and the displacement of rail-served industries. For example, PNWR and its customers are apprehensive about future land use development around WES stations and along the WES alignment.[47] Increased land values and/or the incompatibility of new residential and commercial land uses with the freight rail function of the railroad could drive away industrial customers.

Although planning for land uses that support passenger rail is traditionally encouraged by federal, state, and local policies, planners must understand the existing freight industry—its operations and customers—before implementing a plan that could eliminate valuable rail-served industrial lands. In fact, the *OTP* strategy 3.1.1 focuses on developing coordinated state, regional and local transportation plans that address future freight needs, while strategy 1.2.1 discusses expanding intercity passenger rail service. This is a delicate balancing act. Freight railroads and industrial users should be consulted as to how to best develop station area plans that can integrate passenger service without impeding freight service.

With respect to comprehensive planning, a first priority should be to identify and preserve existing industrial areas with rail service. Preserving industrial infrastructure is usually much more cost-effective than trying to replace it elsewhere. If the loss of industrial land is unavoidable, jurisdictions are recommended to plan for the relocation of the rail-served industries to an area that can be protected as an industrial sanctuary. Some communities have adopted policies for no-net-loss of industrial lands. If industrial lands are rezoned, then a similar amount of industrial land must be created elsewhere within the community in order for the industrial rezoning request to be approved. By making it more difficult to rezone industrial property, such policies provide a measure of predictability and encourage investment by the private sector industries.

Summary of Land Use Impacts

Land use decisions have impacts on freight rail operations and, by extension, the industries served by freight rail. A central message that can be drawn from the issues and examples above is that neither local jurisdictions nor individual businesses can afford to leave rail carriers out of their calculations regarding development. Early involvement of the freight railroads is essential when planning or proposing new uses or development adjacent to a rail line. Whether a city is updating its comprehensive plan, a property owner is seeking rail service, or a passenger station is being considered, involving the rail operator early in the process will increase the likelihood for success for all parties in the short and long terms.

45 *Comprehensive Plan Map*, City of Woodburn, 2005, as amended, accessed December 6, 2009. http://www.woodburn-or.gov/communitydevelopment/planning/compplanupdate/08CompPlanMap.pdf
46 *Transportation Plan*, City of Woodburn, 2005, accessed December 6, 2009. http://www.woodburn-or.gov/communitydevelopment/planning/default.aspx

47 Billy Eason, PNWR President; Ron Russ, PNWR Deputy General Manager; Mike Lundel, PNWR Vice President Transportation; David Anzur, PNWR Director Finance & Administration. Personal Communication. April 23, 2009.

State Ownership

Public ownership of railroad lines might be the norm in most of the world, but in the US public ownership of rail assets does not have much history. Many states, including Oregon, have administered modest grant programs targeted at railroads, but the notion of substantial state and federal funding for system improvements and ownership is very new.

Public investment in rail largely dates to the 1970s and 1980s, when federal deregulation of the industry allowed larger railroads to cease operating marginally profitable branch lines. In some instances, lines were abandoned. To save those lines from abandonment or to preserve service to communities, public agencies began to intervene and assume ownership of assets or to underwrite rail service.

Most states approach public ownership of railroads as the option of last resort, recognizing that the economics of a given property simply will not support costs associated with purchase and operation by a new entity. Often, however, the threat of abandonment of rail lines or loss of service has stimulated state support because of the potential cost to the transportation network and the broader economic and social benefits to be gained by maintaining service.

Public ownership of rail assets in Oregon began in 1918 with the 18-mile COP, which is still owned by the City of Prineville. Today, two other cities—Astoria and Lebanon—own short portions of rail lines.

Oregon has the statutory authority to own and operate rail lines (ORS 824.040). Railroad assets owned by the State of Oregon include the Amtrak station in Salem and 155 miles of right-of-way beneath portions of the PNWR. The land was donated to the state in 1997-1998 by BNSF, but it does not include any of the track infrastructure. The Salem Amtrak station was purchased in 1995 from SP. ODOT Rail Division manages the station and the right-of-way.

Since the mid-1980s, economic pressures and natural disasters have generated requests for the State of Oregon to participate in the purchase of, or to invest in, several rail lines. Although the state has not purchased any rail lines, it has assisted public entities to purchase the following rail lines: LRY (55 miles, Figure 3.15), POTB (85 miles, Figure 3.20), WURR (63 miles), and CBRL (111 miles, Figure 3.12).

The State of Oregon, when faced with such circumstances as in the past, must be prepared to decide whether an investment in a traditionally private-sector business makes economic sense and how such state ownership might be structured. This chapter summarizes four models of state ownership and operations of rail assets in Wisconsin, Oklahoma, Washington, and New Mexico. Those ownership models and Oregon's previous experience can provide guidance for Oregon when faced with railroad ownership and operation decisions in the future.

Northbound Amtrak *Cascades* at the Salem station.

Review of State Ownership Case Studies

Oklahoma, Wisconsin, Washington, and New Mexico have programs to acquire rail facilities. Those states represent four different models for state ownership that are in varying stages of funding maturity. New Mexico is the only example where the state owns the infrastructure solely for passenger operations; the other three states purchased rail lines primarily to support freight operations.

Each case study summarizes seven different aspects of ownership, which are presented in Table 8.1:

1. Administration
2. Program funding
3. Benefit analysis
4. Operations
5. Maintenance
6. Stakeholder impacts
7. Statutory authority

See Appendix J, *State Ownership of Rail Assets*, for more infomation.

Table 8.1 Comparison of State Ownership Models, Oklahoma, Wisconsin, Washington, and New Mexico

	Oklahoma: Freight Rail	Wisconsin: Freight Rail
Ownership	869 miles of track (27 percent of total track miles in the state)	700 miles of track (21 percent of total track miles in the state)
Administration	Department of Transportation (DOT): two full-time positions	County rail commissions: grant operating rights and oversee operations DOT: grant and loan programs to counties for purchase of lines
Program Funding	Purchase of a north-south mainline Revenue comes from leasing the 335-mile line to UPRR and a 10 percent assessment on shortline gross revenues Four percent tax on freight cars not owned by railroads When UPRR's lease expires in 2011 and UPRR takes ownership of the line, the state will lose its largest source of funds for rail maintenance and rehabilitation projects. At that time, almost all of the track will be Class 2, and it will be up to the operators to maintain the tracks to that standard. It is uncertain at this time whether or not the state will provide funding for projects from other revenue sources	Two programs: Revenue-backed bonds fund grant program; repaid by general transportation fund revenues (mainly from gas taxes and value-added tax on railroad property, among others) In 1995, grant funding per biennium was $4.5 million; for the 2009-2011 biennium, it will be $60 million The loan program was first funded by legislative appropriation; now funded by loan repayments with $88 million loaned from 1985 to 2007; loans are limited to $3 million each Operators pay $15,000 to $25,000/year for administrative costs
Method of Benefit Analysis	Cost-benefit analysis, comparing price to purchase the railroad with the value of infrastructure and underlying property	Point formula determines whether purchase is warranted, based on shipping costs, system connectivity, environmental impacts, and economic development
Operations Characteristics	Improving trackage to meet FRA Class 2 track standard speed (25 mph) Carload volumes have grown 25 to 30 percent in last 10 years, with significant recent growth	Initially operators were not very successful because of poor track conditions. Operations on the lines have consolidated and the system has grown to provide three operators with more connectivity and more diverse traffic. The state recently has provided more rehabilitation funding and increased standards for rehabilitation. The goal for mainlines is Class 3 standard; DOT estimates that 50 to 75 percent of branch lines currently meet Class 2 specifications
Maintenance Requirements	Operators required to maintain track to Class 2 standard speed	Operators are generally required to maintain lines to FRA Class 2 standards. When rehabilitated, lines must be maintained to the level of rehabilitation
Stakeholder Impact	Bankruptcy threatened abandonment of Rock Island Railroad mainline; the prospect of loss of service to shippers and future capacity created political consensus between governor's office and legislature for investment	Abandonment of the Milwaukee Railroad deprived large sections of southern Wisconsin of rail service. Political consensus was based on large scale cutbacks and a number of communities losing rail service in a very short time
Statutory Authority	Railroad revitalization act in 1978 empowered the state to act as a railroad authority	A 1977 state program was limited to grants to local governments until a 1992 constitutional amendment allowed for state investments in privately owned railroads

	Washington: Freight Rail	New Mexico: Passenger Rail
Ownership	370 miles of track in eastern Washington (12 percent of total track miles in the state)	270 miles of right-of-way between Belen and Raton. Provides passenger service between Belen and Santa Fe. Future service expected along the remaining 170 miles to Raton
Administration	DOT: one part-time staff having additional responsibilities for Rail and Marine Programs	DOT: designated manager for passenger rail coordinates with Mid-Region Council of Governments (MRCOG) MRCOG: manages the commuter rail corridor and service, Herzog Transit. Operates the service and maintains rolling stock under contract to MRCOG
Program Funding	Legislature funded $14 million for purchase of rail lines and $12.2 million for track rehabilitation in 2003 and 2005. No additional funds have been identified Revenues not generated from leasing	Part of 2003 bonding program, Governor Richardson's Investment Program (GRIP) backed by state highway fund revenue
Method of Benefit Analysis	DOT calculated savings on shipping costs for agriculture, continuation of competition among transportation modes; protection against future fuel cost increases; and avoidance of highway wear and tear. Analysis of highway capital and maintenance impacts of increased trucking of grain also created an economic justification	Compared proposed purchase to other states' corridor acquisitions Compared cost of acquiring a new alignment vs. BNSF right-of-way
Operations Characteristics	Programmed funding is insufficient to upgrade to Class 2, retaining slower speeds as "expected" track class. One operator has struggled to meet operating agreement terms due to low volumes. There has been little to no growth in volumes on the line	Line is shared with Amtrak long-distance trains and BNSF freight trains. Amtrak operates on line between Raton and Belen. BNSF has freight easement on the whole alignment and will be sole operator on the portion that will be part of the proposed Oklahoma to Colorado Front Range high-speed rail corridor until ~2018 Fiscal year 2007-08 had 370,000 passengers
Maintenance Requirements	Operators are required to maintain track in condition received; difficult to meet given the advanced state of deterioration on many properties	State shares maintenance responsibility with BNSF. Private firms compete to perform capital and maintenance work
Stakeholder Impact	Embargo of the lines by a previous operator and strong support of regional agricultural interests led to the decision	Large and growing commuter population in the corridor combined with highway congestion spurred interest in commuter rail State began to support intrastate bus service network several years prior and patronage was strong
Statutory Authority	State has statutory authority to own rail lines and grant operating rights	Ownership of rail property by the state is not restricted by statute

Potential Public Ownership Scenarios

The question of state ownership of specific rail assets is likely to be answered on a case-by-case basis. Oregon will need to justify acquisition of rail assets by demonstrating the need for public investment and how such an investment will benefit the state's economy and transportation system. Outside of the specifics of each case, however, there are general considerations that form a starting point for analysis.

The research into how rail ownership programs began and evolved in Oklahoma, Wisconsin, Washington, and New Mexico revealed four scenarios that Oregon has or might face. Each scenario generates a number of questions that should be answered as part of the decision-making process to purchase a rail line. The scenarios and the questions they raise are described in the following paragraphs.

Abandonment of a rail line because railroad revenues are insufficient for maintaining track conditions. A local carrier plans to abandon a line because revenues do not justify or allow the ongoing capital spending needed for maintenance. Capital investment can no longer be deferred because the line cannot be safely operated without significant rehabilitation.

Abandonment of a rail line because of rapid or unforeseen structural failures. A marginally profitable local freight line may be threatened with abandonment because of damage from floods, or bridge or tunnel failure. Restoration of service requires an infusion of capital.

Preservation of a significant rail corridor. A rail line may be threatened because operating costs exceed revenue or because the major network carrier decides to abandon the line as part of rationalizing its network. The state may consider purchasing the line to preserve the corridor even if the current low volume of business does not appear to justify short-term restoration of rail freight service. A local or regional entity (such as a port) may request the state funds through loans, grants, or lines of credit because it lacks the large amounts of capital for acquisitions.

New or Intensified Passenger Service. A rail line could be slated for major infusions of public capital to support commuter or intercity passenger rail operations. Freight service would also continue on the line, but infrastructure investment would largely be driven by passenger service requirements.

Oregon State Ownership Considerations

A number of questions arise when the state first considers purchasing rail assets—many are seen reflected in the four ownership case studies. Addressing the broader questions before faced with an ownership opportunity arises will help to create a solid policy and program foundation for making decisions. Those questions will also likely need to be re-evaluated for each request.

ADMINISTRATION

1. How will a state-owned program be administered? Can the state manage the program with existing resources or will more employees and/or funding be necessary for success?
2. If the state assists a local or regional public agency in acquiring assets, how will the state financing (grants, loans) be administered and expenditures accounted for?
3. Who will lead efforts to coordinate with and gain required approvals from the STB?

PROGRAM FUNDING AND FINANCIAL CAPACITY

1. What are the expected the operating, maintenance and capital costs for the rail line?
2. What types of ongoing funding is available for future infrastructure investments?
3. What are the capital investment needs and history of the line?
4. Will local communities, counties and shippers participate financially in an effort to preserve the line? If so, at what level?
5. What state funding and financing sources are available? Is the proposed purchase eligible for these sources?
6. If a local or regional public entity is to take ownership of the rail assets instead of the state, do they have the financial capacity to fund operations and maintenance without additional state assistance?
7. Is the purchase eligible for assistance from the Strategic Reserve Fund or the Infrastructure Finance Authority?[48]
8. Can other possible funding partners be identified, such as a neighboring state that would be affected by a loss of service?
9. If the state is one of many public funders, at what point should the state "own" the asset?

BENEFIT ANALYSIS

1. Is the investment to make the line operational proportionate to the economic benefits that would be gained from restored rail service?
2. Are there new markets in the corridor that could be served by rail? If so, what would it take to serve them?
3. What are the potential long term uses of the rail corridor for through freight movement? Can it be used as a complement to other rail corridors for additional capacity, directional running, and specialized freight or passenger operations?
4. What potential but undeveloped opportunities exist for short-haul local movements that could add volume to the line?

48 The Strategic Reserve Fund (SRF) is administered by the Oregon Business Development Department (ORS 285A.075). The Infrastructure Finance Authority (IFA) was created in the 2009 legislative session and administers a number of grant, loan, and innovative finance programs for infrastructure. Both the SRF and IFA have capabilities to respond to critical needs and emergencies within short timelines.

5. What other options (besides state ownership) could be implemented to preserve the rail line? Is "rail banking" under the federal Rails to Trails to Rails legislation a possible alternative? Is a Discontinuance of Service under the STB a viable option?

OPERATIONS

1. What are the liability issues related to freight and/or passenger rail operations?
2. What are anticipated challenges and risks of negotiating with the railroad(s)?
3. Could public ownership change the competitive role of the line? Is there an opportunity or need to eliminate or mitigate restricted access?
4. Does the line have competitive rail access or is it committed to one major railroad?
5. What is the attitude of the current corridor owner(s) toward sale or long term lease of the line to the state?
6. What recourse is available to the state if an operator defaults on his obligation?
7. Will ownership of a line provide better guarantees for passenger rail service goals?

MAINTENANCE

1. What are the on-going maintenance and deferred maintenance costs?
2. Do revenues from ongoing rail operations cover operating costs; in other words, would the operation be "profitable" on a short term basis if the deferred maintenance deficit was eliminated?
3. If natural disaster played a part in creating the crisis leading to the sale of the line, how likely is it that the same circumstances could recur? Does the alignment traverse areas prone to flooding and/or landslides? What can be done to mitigate these risks?

STAKEHOLDER IMPACTS

1. What would be the impact of a service shutdown on employment and the viability of served customers?
2. Should the line be saved to maximize development potential of adjacent industrial property? Is the site(s) compatible with local public planning goals?
3. Do long term economic strategies for the service area envision continued rail service? Is there efficient and good connectivity to more than one mode of transportation (water, highway, or air) that can support and springboard rail investment?
4. If service does not reopen, do viable transportation alternatives exist for transporting commodities and products produced and/or needed in the service area? What are the community impacts of shifting to those alternatives?

STATUTORY AUTHORITY

Oregon has the statutory right to own and operate rail lines. In fact ORS 824.040 states that the State of Oregon, a city, county, county service district, mass transit district, transportation district or a port may acquire, own, reconstruct, rehabilitate, operate or maintain a railroad line for the benefit and use of its inhabitants and for profit. In most cases statutory authority will not be an issue for public ownership in Oregon.

Summary of State Ownership Study

The benefits of state rail ownership are significant and can support the preservation of a key part of Oregon's transportation infrastructure and the businesses and communities that depend on it. State ownership also carries risks. Four states have taken on ownership of rail infrastructure with varying degrees of success:

- With the purchase of a key infrastructure asset–a mainline–Oklahoma has been able to use lease revenues to upgrade other lines around the state, providing private operators and shippers with sound rail infrastructure.
- In Wisconsin, it took several years for the state to address the need for sustained investment in the infrastructure it purchased. With increased funding over the years, Wisconsin has a well developed public rail network which is operated mostly by one railroad. Volumes have been growing and the southern region of the state has retained the option to ship by rail.
- Washington state is a relative newcomer to rail ownership and is facing many of the same problems that Wisconsin did initially. There is no program in place to fund the upgrades of the lines which are in very poor condition, and at least one operator has indicated that it is difficult to generate sufficient revenues to cover operating costs.
- Passenger rail operations typically require a strong coalition of public partners from the beginning. Because track conditions are maintained at much higher standards for passenger rail, the costs of maintenance and ongoing operations become primary considerations.

As the rail industry continues to change in Oregon, the state can expect to be faced with more decisions about whether or not to purchase or operate rail lines. Currently, Oregon owns 155 miles of rail right-of-way, the Salem passenger rail station, and has assisted other public entities in purchasing rail lines including: LRY, POTB, WURR, and CBRL. However, in preparing for future opportunities that will arise, Oregon can look to other states that own and operate rail lines to inform its future decisions. States that have committed resources to support long term freight rail programs have been the most successful, seeing fruitful operations and growing volumes over time. Other states that own lines without a well-supported program continue to struggle. Purchasing a low-business freight line to convert to a passenger operation, like in New Mexico, requires a strong coalition of public partners from the beginning because the higher maintenance and operations costs, and community impacts of increased trains. Lessons from these states can provide insight as Oregon address future ownership decisions.

Funding Options and Return on Investment

Past public funding for rail has been very limited and, when available, has mostly been directed to passenger activities or "life support" assistance for ailing secondary lines such as those operated by shortline railroads. Despite the economic, energy efficiency, and environmental advantages of rail, most public surface transportation funding has been directed to the highway network, the main competitor for rail traffic. Federal regulatory oversight and preemption of local regulations have further frustrated attempts by state and local authorities to engage carriers in comprehensive and systematic planning efforts.

Recently the federal administration stepped up funding and efforts to improve the safety and function of the country's rail infrastructure and services. The Rail Safety Improvement Act (RSIA) and PRIIA both were enacted in October 2008, followed by the landmark ARRA legislation, which was passed in February 2009. RSIA and PRIIA, administered by the FRA, mandated new and expanded mission responsibilities and programs, while ARRA appropriated an unprecedented initial $8 billion in additional program resources for high-speed passenger rail (also administered by the FRA).

Parallel to the recent federal initiatives for rail investment, states across the country—California, Florida, Ohio, Illinois, Michigan, Maine, Pennsylvania, Rhode Island, Texas, North Carolina, Washington, Colorado, and Missouri—are looking at their funding options for leveraging the federal monies to significantly advance rail options for freight and passenger service.

Oregon's strategic investment, in areas where private market forces or incentives to preserve rail infrastructure are comparatively weak, will benefit Oregon communities and the regional economies. State initiatives such as *Connect*Oregon I (2005), *Connect*Oregon II (2007), and *Connect*Oregon III (2009) have opened the door to more cooperation between the private and public sectors of rail transportation. *Connect*Oregon is a lottery-bond-based initiative to invest in air, rail, marine and transit infrastructure. It focuses on improving the connections between the highway system and the other modes of transportation to better integrate the components of the system, improve flow of commerce and remove delays. Highway projects are not eligible for *Connect*Oregon funding. Interest in economic development, passenger rail services, energy efficiency, and reducing GHG emissions can be the impetus for leveraging the relative strengths of each of the sectors.

States fund rail programs using diverse methods. For example, Oklahoma raises $800,000 per year from assessing a $0.001 per dollar fee on freight car value. Tennessee raises $11 million per year by levying a 5.5 percent fuel tax on railroad diesel fuel. Virginia, Washington, and Maine all have a surcharge on rental vehicles that raises between $2.5 million and $25 million per year for each state.

State Funding

Part of the scope of the *Oregon Rail Study* was to examine Oregon's options for funding rail investment based on an investigation of existing Oregon programs and programs in other states. Table 9.1 identifies 17 potential sources of revenue for the Oregon rail program. Twelve of the 17 are existing sources that are already used for rail by other states. Five sources have not been used for rail but could be considered for that use. All the revenue is assumed to be applied to state rail investments only. Many of the funding sources used in other states are currently prohibited for non-highway use under the Oregon Constitution. Oregon is unique in that "all revenue from taxes on motor vehicle use and fuel…shall be used exclusively for the construction, reconstruction, improvement, repair, maintenance, operation and use of public highways, roads, streets and roadside rest areas in this state.[49]"

Several points need to be kept in mind in considering each tax or fee: the potential for revenue generation; the costs/burden/responsibility of administration; and who pays (equity implications) and potential impacts of a new tax or fee on the ability for economic growth. Table 9.1 presents this information for each of the funding sources.

Revenue Generation

The data in Table 9.1 was developed to provide an estimate of the yearly revenue that each source might generate for a specific tax or fee. Sources that already exist and are used for rail could yield from $600,000 to over $32 million annually. For "other" sources not yet used for rail funding, a flat rate was estimated to allow for understanding how incremental amounts of taxation or revenue change the potential yield. In other words, if a one-cent charge generates $1 million a year, a two-cent charge would generate $2 million. The estimates of potential revenue generation are on an order-of-magnitude basis for purposes of comparing the relative utility between the taxes and fees.

Administration

The assessment and collection column of Table 9.1 identifies the entity that would likely collect the tax or fee. This information is important because collecting revenue costs money for accounting and administration. Where collection systems are already in place, the costs will be lower than where a new system would have to be set up.

Equity Implications

To the extent known, the equity column identifies the parties that would directly pay the tax or fee. The potential funding analysis did not investigate the potential for the costs of some fees to be passed on to other parties nor did it assess the potential impact on business growth.

49 Constitution of Oregon, Article IX, Section 3a.

Table 9.1 Potential Sources of Revenue

Source	Description	Equity (Who Pays)	Estimated Revenue Yield*	Assessment and Collection	Freight (F) Passenger (P)	Where in Use for Rail	Oregon Context
Existing Available Sources							
Freight Car Fee (Volume-Based)	Fee assessed on railroads' cargo by weight or volume or a per box fee; usually specific to a corridor or facility	Shippers if strong market; otherwise, carriers	$2-3 million/year from $2.00 fee on all carloads, statewide $1-2 million/ year from $2.00 fee on carloads starting or ending in state only	On railroads by authority or a port	F	Alameda Corridor ($18/loaded maritime TEU + $5/empty maritime TEU + $9/ other rail cars — ~$90 million/year); Shellpot Bridge, DE (decreasing toll with additional volume [$5-$35/car] — ~$1 million/year); Sheffield Flyover, MO	Investments would need clear railroad benefits to keep freight traffic from diverting to other modes or routes
Freight Car Fee (Revenue-Based)	Fee assessed on railroads' cargo by value or revenue	Freight car owners/ operators or passed through to shippers	$600,000 from $0.001 fee on each dollar of gross railroad revenue	On gross revenue of either railroads or owners/ operators of freight cars by ODOT	F	Oklahoma (4% of gross revenue derived from the use or operation of freight cars within state [but railroads are exempt] — $800k/year)	Several small shippers in Oregon; also, question about whether liquefied natural gas could be taxed if transported by rail. Would require legal analysis to determine any legal implications or prohibitions
Railroad Diesel Fuel Tax	Fuel tax on railroad engine diesel fuel	Shippers if strong market; otherwise, carriers	$3 million/ year from tax of $0.05/gallon	ODOT could assess railroads on a gross-ton/mile basis	F	Tenessee (5.5% tax — $11 million/year)	
Rental Car Tax	Surcharge or tax on rental vehicles	Auto renters	$8-14 million/ year from 5.9 percent tax	State Department of Revenue via rental businesses	F, P	Virginia REF (3% — $25 million/year) Washington (5.9% — $23 million/year) Maine Downeaster (5% — $2.5 million/ year)	Already assessed by some local entities; unclear whether a tax on car rentals would be constitutionally dedicated
Lottery Funds	Lottery receipts dedicated to rail improvements	Lottery participants	*Connect*Oregon ~$100 million/ year for multimodal investments, including rail	Existing state lottery administration and collection	F, P	Oregon (~$100 million/year for multimodal with some to rail through *Connect*Oregon)	Many programs are supported by Oregon Lottery funds, including *Connect*Oregon. *Connect*Oregon may continue but unlikely that additional Lottery funds could be tapped for increases in *Connect*Oregon funding levels
Motor Vehicle Sales and Use Tax	Sale and use tax on retail sales, leases, and transfers of motor vehicles	Motor vehicle purchasers	$19 million/year from 0.3 percent tax	Collected by vendor (dealer) at time of sale; if not paid at time of sale, collected by the DMV	F, P	Washington (0.3% tax — $36 million/ year for Multimodal account [some to rail])	Would require Constitutional change to use for rail; no state sales tax in place
Passenger Vehicle Weight Fees	Fee added to annual license fee, based on vehicle scale weight	Passenger vehicle owners	~$28-32 million/year from $10/year on most vehicles	Collected by DMV	F, P	Washington (Most vehicles pay $10/year fee — $54 million/ year [most goes to Multimodal account; some to rail]	Would require Constitutional change to use for rail
Motor Home Weight Fees	Flat fee added to annual license fee	Motor home vehicle owners	$4 million/year from $75/year fee	Collected by DMV	F, P	Washington ($75/year fee — $6 million/ year [Multimodal and Freight accounts; some to rail])	Would require Constitutional change to use for rail. Projections estimate a decline of about 1.5-7 percent each year in motor home registrations
Motor Vehicle Title Fees	Flat fee added to all transactions concerning vehicle titles	Purchasers of motor vehicles or owners who need a copy of title	$5 million/year from $5.00 transaction fee	Collected by DMV	F, P	Washington ($5 for any title transaction — $11 million/year [some to Multimodal account; some to rail])	Would require Constitutional change to use for rail
Title Transfer Penalty Fees	Penalty fee for not transferring a vehicle title within 15 days of a private-party vehicle sale	Motor vehicle owners	$1-2 million/ year using Washington state example: $25 after 15 days; $2.00 a day thereafter up to $100)	Collected by DMV	F, P	Washington ($25-$100 fee — $3 million/year for Multimodal account [some to rail])	May require Constitutional change to use for rail; evasion is an issue
Motor Vehicle Fuel Tax	Tax on the sale of motor vehicle fuel	Motor vehicle (weighing <26,000 lbs in Oregon)	$17 million/ year from $0.10 increase	Usually collected at the bulk storage level of the supply chain	F, P	North Carolina	Would require Constitutional change to use for rail
General Sales Tax	Tax on general retail transactions	Consumers	N/A	Collected by vendors (e.g., retailers)	F, P	Indiana (0.033% — $1.3 million/year)	Oregon does not have a state sales tax. Should Oregon adopt a sales tax, the rate should be sufficiently high enough to justify the collection and administration costs

Source	Description	Equity (Who Pays)	Estimated Revenue Yield*	Assessment and Collection	Freight (F) Passenger (P)	Where in Use for Rail	Oregon Context
Other Options							
Auto Insurance Fee	Additional fee or tax assessed on auto insurance	Motor vehicle drivers	$12 million/year from $24 annual fee on coverage above mandated liability	Collected through insurers	F, P	Not in current use for rail	Governor proposed a similar fee in 2007 for state police
Intercity Rail Station Passenger Facility Charge	Charge on tickets for intercity rail usage	Intercity passenger rail riders	$1 million/year from $2.50 on each departure	Collected by intercity service provider (e.g., Amtrak)	P	Not in current use (considered for New York Penn Station)	May not generate additional revenue beyond required operating subsidy
Forest Products (Timber) Harvest Tax	Tax based on the value or amount of timber harvest	Timber producers	$4 million/year from $1.00 per 1,000 board-feet	Collected by Department of Revenue (mechanism already in place)	F, P	Not in current use for rail	Oregon ships 60 percent more lumber/wood products by rail than any other state. Tax already in place for other (forest) uses; scheduled to expire 12/31/08
Port Fees (on Bulk Tonnage)	Fee on bulk cargo traveling through Port of Portland	Consignee for bulk commodities	$9 million/year from $1.00 per ton on all bulk cargo	Assessed at port processing center	F	Not in current use for (non-port) rail	Portland is the largest wheat exporter in the US; largest mineral bulk port on the West Coast
Port Fees (on Containers/ Automobiles)	Fee on containers and automobiles traveling through Port of Portland	Shippers	$2 million/year from $3.00 per container or auto	Assessed at port processing center	F	Not in current use for (non-port) rail	

Return on Investment: Making the Case for Rail Improvements

When public spending is proposed for investment, the case must be made for how that investment will generate a positive return, and whether that return can be measured in dollar values or in other ways. Both the public sector and private businesses try to estimate how effective their spending will be. "Cost-benefit" analyses of project and program investment alternatives identify the expected return on the investment. In other words, will the results be worth spending the money?

Benefits minus the costs are measured. The most difficult and usually most controversial part is placing a dollar value on benefits that are not easily measured because they are indirectly caused or have no market value because they are public goods, such as clean air. Investment can cause both positive public goods—such as safety—or negative public goods (or costs)—such as pollution—to be created. Assigning values becomes especially important when costs are tangible and direct but the benefits are less tangible and more diffuse, such as the costs and benefits of reducing GHGs.

Given the growing interest in rail and rail funding, there have been assumptions at both the federal and state levels that real and tangible benefits will result from investments in the rail network. Much research has gone into investigating what seems intuitively correct—that where goods and people can be moved by rail more effectively, economically, and with fewer environmental impacts, those options should exist, and if they don't exist, why don't they? There may be a role for governments in helping overcome the barriers to developing or using rail options for passengers and freight. It is important to identify what benefits might be expected that would justify spending public money to promote a better rail network.

The *Oregon Rail Study* pulled data from a variety of sources to quantify the impacts that using rail transportation has on quality of life issues such as reducing pollution, congestion, and fuel consumption, improving safety, and growing the economy. Below is a list of the performance benefits associated with passenger and freight rail use compared to highway use. The facts and assumptions behind these points are detailed in *Rail Industry Return on Investment Calculations*, Appendix L.

THE FACTS

ENVIRONMENT

- Every ton of freight shipped by rail reduces GHG emissions by 86 percent compared to moving the same freight by truck.
- Every ton of freight shipped by rail reduces fuel consumption by 62 percent compared to moving the same freight by truck.
- Every ton of freight shipped by rail uses 91 percent less energy than the same amount of freight moved by truck.
- Intercity passenger trains use 47 percent less energy than if the same passengers traveled by passenger vehicles.

CONGESTION

- The average freight train in Oregon reduces delay by 3 minutes on 139 miles of highway.

HIGHWAY MAINTENANCE

- The average freight train in Oregon reduces highway pavement costs by $645.
- Every dollar invested in rail capacity saves $10.60 in highway user costs including travel time, incidents, vehicle operating costs and highway maintenance.

SAFETY

- Current freight train volume in Oregon prevents 442 highway accident injuries each year.

JOBS AND THE ECONOMY

- Each $1 million spent by the state on rail projects creates 46 new jobs.
- Each ton of freight shipped by rail saves Oregon shippers an average of $34.47 in shipping costs per trip.

BENEFITS OF INCREASED USE OF RAIL

REDUCING DIRECT COSTS AND CONGESTION (INDIRECT COSTS)

Moving freight by rail rather than by trucks saves Oregon money needed for highway maintenance. One train can typically carry as much as 280 trucks. The average truck trip per day is 139 miles, and costs the agency $3.73 per mile per year in highway pavement maintenance. That cost does not include the cost to add new lanes to reduce congestion. Daily, Oregon trains carry goods that would require the equivalent of approximately 1.7 million truck miles. The wear to highway pavement that is avoided by train use amounts to a cost savings to Oregon of approximately $645 per train, or about $7.6 million per year.

In addition to lower maintenance costs for Oregon from moving freight by rail, other highway users save money. When rail capacity expands and shipping shifts from trucks to trains, highway user costs decline, because congestion and its associated costs are reduced. Delays are shorter and accidents are less frequent, so the costs to operate vehicles decreases. National studies show that for each dollar invested in rail capacity, highway user costs are reduced by $10.20.

Congestion costs the economy in a number of ways. Congestion increases the risk of accidents. When fewer vehicles are on the roads, fewer accidents occur, thus lowering congestion also increases safety. Current freight train volumes in Oregon are estimated to prevent 442 highway accident injuries per year. In addition, businesses incur costs when congestion causes delays of shipments. An average freight train reduces delay by three minutes on 139 miles of highway (an average truck trip). Three minutes may not sound like major time savings, but multiplied by the average number of trains a day in the I-5 corridor between Eugene and Portland (30), is 90 minutes of delay. Freight train use has prevented worse congestion on Oregon roads than would otherwise be the case and, to the extent that commodities move from trucks to rail, the increase in congestion can be slowed, reducing the need for more highway capacity.

Rail capacity investments improve rail freight service quality. Projects such as double-tracking or adding or lengthening passing loops offer quite significant returns in reducing delays on track from unexpected train conflicts and allow more flexibility in scheduling.

THE ENVIRONMENT AND FUEL USE

There have been many state initiatives on sustainability issues over the last ten years. The Western Regional Climate Action Initiative (2006) called for targets to reduce emissions in California, Oregon, Washington, Arizona, and New Mexico. Western states have suffered from prolonged drought, decreased snowfall, increased and earlier snowmelt, and more severe and devastating forest and rangeland fires in recent years as a result of changes in the climate. The Intergovernmental Panel on Climate Change predicts that the western US will be especially affected by increased temperatures and climatic changes resulting from the build up of GHGs in the atmosphere.

House Bill 3543 (2007) codified Oregon's GHG reduction goals. In 2010 Oregon should begin to reduce GHG emissions, so that by 2020 GHG levels will be 10 percent less than 1990 levels, and by 2050 GHG levels will be 75 percent below 1990 levels. The legislative findings noted that global climate change poses a serious threat to the economic well-being, public health, natural resources, and environment of Oregon. Climate change is expected to have detrimental effects on many of Oregon's largest industries, including agriculture, wine making, tourism, skiing, recreational and commercial fishing, forestry, and hydropower generation, and will therefore negatively impact the state's workers, consumers, and residents.

Trucks produce 134.4 grams of CO2 per ton-mile. Trains produce 18.6 grams of CO2 per ton-mile. Shipping a ton of freight a mile by rail rather than by truck avoids the production of 115 grams of CO2. Consequently, shifting freight from trucks to rail where possible is likely to reduce emissions by 86 percent.

The reason that trains emit fewer GHGs is that they are more fuel efficient in moving a ton of goods. On a gallon of fuel, a truck will move one ton of freight 155 miles while a train will move that ton 413 miles, nearly three times farther. Intercity train passengers use 47 percent less energy than the same passengers traveling by single vehicle.

Clearly, reducing fuel consumption not only reduces GHG emissions but has other wider health, economic, and political benefits for the country. It reduces American dependence on foreign sources of oil and reduces the need for finding new fuel sources in sensitive areas of the environment. In terms of health issues, vehicle emissions contain multiple toxins that have only begun to figure in the calculations of health impacts of fossil fuel use.

ECONOMIC BENEFITS

Many societal benefits of rail transportation have been mentioned, such as the fuel costs saved by businesses and individuals, maintenance costs saved by Oregon, and social costs of accidents and congestion delays that can be avoided. Rail investment results in economic and job benefits as well. During the recession of 2008-2009, Oregon has suffered from some of the highest unemployment rates in the country. Other states have estimated the number of jobs created by investment in rail improvements. For example, Pennsylvania determined that a $93 million investment in rail improvements created an estimated 9,700 jobs. Virginia created 3,900 jobs with $245 million spent on rail. The AAR estimates that $1 billion in rail investments has created 20,000 jobs. Together these figures average 46 new jobs for each $1 million investment. Public investment by definition is likely to create employment wherever it is spent, either indirectly or directly. In addition, each ton of freight shipped by rail saves Oregon shippers an average of $34 in shipping costs per trip. Rail shipping costs $0.022 per mile compared to $0.27 for shipping by truck.

Summary of Funding Options and Return on Investment

Oregon has long recognized that communities depend on having multiple transportation options. As the population grows, building more roads alone cannot accommodate the increasing traffic and still maintain livable communities. Robust freight and passenger rail service is part of the solution. However, state funding for this program is limited. Unlike many other states, a permanent funding source for rail infrastructure or equipment investment does not exist in Oregon. Passenger rail funding is limited to the sale of custom vehicle license plates, which yields about $4 million per year. A sustainable rail funding source is needed for Oregon to take advantage of rail's valuable contribution to the state's livability and economy.

CHAPTER 10

Conclusion

The Purpose of the Oregon Rail Study

The purpose of the *Oregon Rail Study* is to close the gaps in Oregon's knowledge about its existing rail system and its potential to grow and provide solutions to transportation challenges. The study also provides the foundation for an update to the *Oregon Rail Plan*.

The *Oregon Rail Study* includes an infrastructure assessment of Oregon's shortline railroads, analyses of the state's freight rail industry, an assessment of expanding intercity and commuter passenger rail services, rail industry trends and mitigation strategies, identification of potential funding sources and strategies, return on investment measures, and an examination of the role for state ownership of rail services.

Rail Infrastructure

The Class I railroads operate vast networks across the country and are vital to the national economy. Oregon's Class I railroads are BNSF and UPRR. Both railroads are financially sound and well-positioned to recover when shipping volumes return to pre-recession levels. The mainlines are in good condition for freight service. Their future is potentially constrained by capacity issues, but not condition issues.

In contrast to the Class I railroads, Oregon's shortlines have available capacity, but the capital intensive nature of the business combined with deferred maintenance of infrastructure and the recent market declines present multiple challenges. The existing conditions of shortline track, bridges, and tunnels were assessed as part of the *Oregon Rail Study*.

The tracks belonging to shortlines are classified as Excepted, Class 1, or Class 2. About half is Class 1 or Excepted, allowing speeds of only 10 to 25 mph. Upgrades would be needed to allow faster speeds. Estimates to upgrade all of Oregon's low density network for 40 mph freight operation range between $150-600 million ($500,000 to $2 million per mile).

An assessment of 332 shortline bridges revealed that 21 percent are in "good" condition, 50 percent are in "fair" condition, and 29 percent are in "poor" condition. To upgrade all of these bridges to a 20-year life expectancy and take heavier loads and double-stacked cars at 25 miles per hour would cost about $142 million. To replace all 332 bridges would cost about $1.4 billion.

Similar to the bridge study, the investigation of tunnel conditions focused on the shortline network. The study evaluated existing conditions and costs associated with rehabilitation to 20-year life expectancy and upgrade to allow taller "double-stacked" cars. Twenty-four of the 68 railroad tunnels in Oregon were studied. Twelve require rehabilitation to extend their life to 20 years, at an estimated cost of $32 million. All but one would require updating to allow for double-stacked railcars at an estimated cost of $92 million.

Potential line abandonments by shortline railroads are driven by the high capital costs, low rates of cargo diversification, and the inability to tap into growing markets. Line abandonments would effectively cut off access to the national rail network for many carload rail shippers and dozens of communities around the state.

Freight Rail Service

The Class I railroads are large, complex, competitive companies focused on making the best business decisions for each of their networks. Understanding the Class I business model, and how Oregon fits in it, is the first step in determining how Oregon can affect the rail industry in the state.

Class I railroads have increasingly favored movement of large volume, unit train shipments as a means of obtaining maximum tonnage and revenue on their capacity-constrained networks. Although the Class I carriers are required by law to provide service for carload traffic, sometimes carload service may be unprofitable or even costly to the Class I railroads. For this reason, some Oregon shippers cannot obtain competitive pricing and service.

The large railways can be expected to invest to protect their competitive advantage in the national market. However, these investments will not necessarily address the needs of Oregon customers seeking access to rail service for shorter distance or smaller volume movements.

Shortline carriers play an important role in connecting smaller communities and shippers to the national rail system, but there are challenges to operating and growing traffic on these lines. High capital costs and restrictive contractual agreements constrain their growth.

Strategies for Oregon to plan and partner with railroads to preserve and expand rail access in Oregon include: increasing capacity, developing hub facilities for transloading and aggregating shipments, providing equipment, maximizing the development of existing rail-friendly land, improving deteriorating infrastructure, and growing intra-Oregon rail traffic.

Passenger Rail

INTERCITY PASSENGER RAIL: PORTLAND TO EUGENE

The *Oregon Rail Study* assessed the two existing rail lines between Portland and Eugene for providing improved future intercity passenger service. Without capacity improvements, by 2030 travel times for the existing Portland to Eugene intercity service could lengthen to over three hours each way. With improvements and increased frequency of service, intercity passenger rail ridership could more than double by 2030. Without improvements ridership will only increase by 49 percent.

The OE alternative would attract more riders, be less expensive to construct and maintain, and improve PNWR and UPRR freight service without risking on-time performance of the passenger trains. Cost estimates to improve service on the OE line are estimated at $1.8 billion and over $2.1 billion on the UPRR line.

The next phase to implement higher-speed passenger service in the Willamette Valley will include an Alternatives Analysis to review other potential routes and identify Oregon's preferred route. This is a requirement before Oregon can qualify for federal HSIPR funding.

INTERCITY PASSENGER RAIL: EUGENE TO ASHLAND

Many challenges facing implementation of intercity passenger rail between Eugene and Ashland render initiating passenger service infeasible at this time. The estimated cost of improvements on the existing rail line exceeds $2.9 billion, while attracting less than 2,700 passengers per year. Travel time on an improved, existing alignment between Eugene and Ashland is estimated to be just over five hours, which is significantly longer than three hours by automobile, or four hours by bus, and is the primary deterrent to potential passenger rail riders.

COMMUTER RAIL

Since 1997, six studies have examined the idea of adding commuter rail service in Oregon corridors. The *Oregon Rail Study* offers guidance on conducting future commuter rail research.

The *Oregon Rail Study* included an assessment of extending the existing commuter rail service between Beaverton and Wilsonville to Salem. The assessment revealed that extending commuter rail to Salem is technically feasible, but it faces operational and financial challenges such as lack of support from PNWR, the host railroad, and lack of identified funding. Ridership is estimated at 3,000 to 4,000 per day by 2030. Capital costs are estimated at $327-387 million and operation costs are estimated at $5.5-6.9 million per year.

Land Use Impacts

Many Oregon communities were settled along the state's rail lines, most of which remain in operation today. Demand for freight and passenger rail is projected to increase, which means more trains will be operating throughout Oregon. The increase in the frequency of trains will present benefits and challenges for rail carriers and the communities along the rail corridors. Careful community planning must be undertaken to avoid creating new conflicts or exacerbating existing conflicts between heavy rail and neighborhoods. The common conflicts between rail and adjacent land uses can be grouped under three issue areas: the impacts of increased train frequency on communities, the ability of shippers to gain access to rail service, and the impacts of community development on the freight railroad.

Land use decisions have impacts on freight rail operations and, by extension, the industries served by freight rail. To preserve Oregon's freight rail system, local jurisdictions nor individual businesses can afford to leave rail carriers out of their calculations regarding development along rail lines. Early involvement of the freight railroads is essential when planning or proposing new uses or development adjacent to a rail line. Whether a city is updating its comprehensive plan, a property owner is seeking rail service, or a passenger station is being considered, involving the rail operator early in the process will increase the likelihood for success for all parties in the short and long terms.

State Ownership

The benefits of state rail ownership are significant and can support the preservation of a key part of Oregon's transportation infrastructure, and the businesses and communities that depend on it. State ownership also carries risks. Four case studies are examined: Oklahoma, Wisconsin, Washington, and New Mexico.

As the rail industry continues to change in Oregon, especially the shortlines, the state can expect to be faced with more decisions about whether or not to purchase or operate rail lines. Currently, Oregon owns 155 miles of right-of-way, the Salem passenger rail station, and has assisted other public entities in purchasing rail lines. However, in preparing for future opportunities that will arise, Oregon can look to other states that own and operate rail lines to inform its future decisions. States that have committed resources to support long term freight rail programs have been the most successful, seeing fruitful operations and growing volumes over time. Other states that own lines without a well-supported program continue to struggle.

Funding Options and Return on Investment

Current rail funding in Oregon is limited to the sale of custom vehicle license plates, which yield about $4 million per year dedicated to passenger rail programs. Currently, funds do not exist for planning, equipment, capacity enhancements, or maintenance of freight or passenger rail investments. The *Oregon Rail Study* includes revenue options used in other states and how each could be applied in Oregon. A sustainable rail funding source is needed for Oregon to take advantage of rail's valuable contribution to the state's livability and economy.

The Way Forward

FOUNDATION FOR INFORMED DECISIONS

The *Oregon Rail Study* provides a foundation assessing the needs, benefits, and costs of enhancing the rail system and what the future role of Oregon could be in maintaining and growing that system, including:

- An inventory of existing conditions of shortline infrastructure including costs to replace, repair, or upgrade the infrastructure to make shipping by rail more competitive;

- An updated Oregon commodity flow analysis identifying the corridors with the most freight rail growth potential;
- Strategies for improving freight rail growth in Oregon;
- An inventory of freight rail lines considered "at-risk" of abandonment;
- Three feasibility studies for two potential intercity services (Portland to Eugene and Eugene to Ashland) and one commuter service (Wilsonville to Salem);
- A review of past commuter rail studies' issues to consider when evaluating commuter rail service;
- An analysis of land use impacts on freight rail service;
- A review of different state ownership models to assist the state in optimizing its role in supporting the rail system while avoiding some of the pitfalls experienced in the past and by other states; and
- An analysis of state funding options and potential returns on investment.

This information will be used to update the *Oregon Rail Plan*, a federally-required statewide freight and passenger rail strategy, contribute to other state, regional and local planning efforts, and inform policy makers on potential strategic rail investments for Oregon.

OREGON DEPARTMENT OF TRANSPORTATION