Oregon Department of Transportation – Rail Division

Oregon Rail Study Appendix D

Oregon Rail Economic Trends

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Introduction

The Oregon Department of Transportation (ODOT) has invested in a statewide rail economic conditions study, as part of Task 6 of Work Order Contract 5 (WOC5). This data analysis will meet the needs of the ODOT Statewide Multi-modal Freight Plan. This document provides an overview of the methodology used to summarize the Surface Transportation Board's Rail Waybill data. This dataset contains a rich level of detail for rail movements in and through Oregon.

The report first discusses the methodology used to process the dataset. The findings section summarizes the results by direction of flow and as corridors.

Methodology

The Surface Transportation Board Carload Waybill Sample data is the most detailed set of data for rail movements in the state of Oregon. ODOT provided PB with the Confidential Rail Waybill data set for the years 1986 through 2007. The data is a sample, meaning that not every shipment is represented, but each record contains an expansion factor so that the sample can be factored up to represent all shipments.

The following fields were extracted from the raw data set and used for this report:

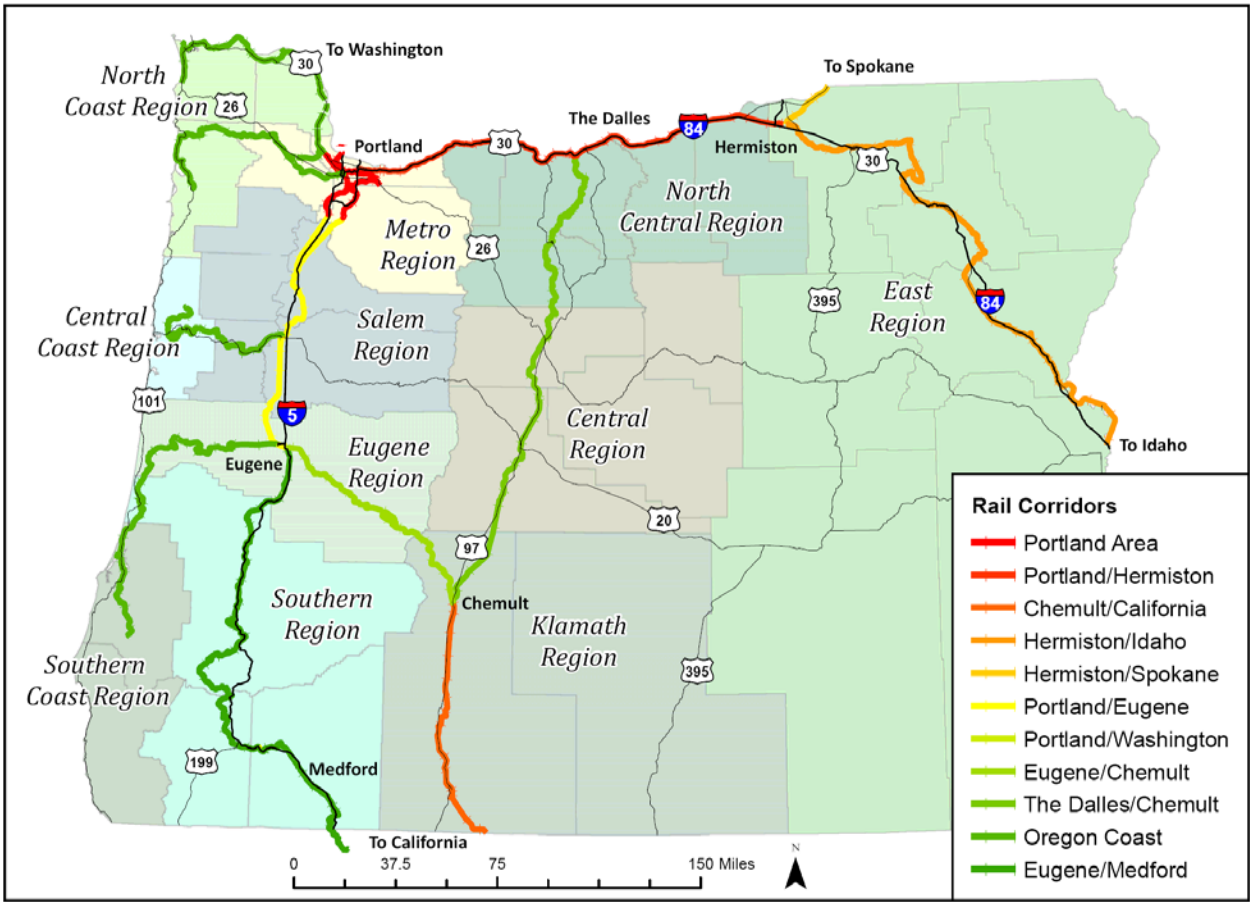
- STCC – Standard Transportation Commodity Code
- Carloads – Carloads in record
- Tons – Tons in record
- Origst – Origin State
- Deststt – Destination State
- OrigFIPS - Origin County Federal Information Processing Standard
- DestFIPS – Destination County Federal Information Processing Standard
- OrigFSAC – Origin Freight Station Accounting Code
- DestFSAC – Destination Freight Station Accounting Code
- Exp – Expansion factor to apply to the sample record

The Waybill data set is specific to Oregon and contains trips with an Oregon trip origin or destination, as well as trips that travel through Oregon (i.e., trips from Washington to California). The Rail Waybill data trip ends (origin or destination) inside of Oregon were grouped by Freight Station Accounting Code (FSAC), which is specific to a station and a rail line, and the county Federal Information Processing Standard (FIPS) code. Outside of Oregon, locations were identified by the state name (including Canadian provinces). The data was further classified as either Portland (Clackamas, Multnomah, Washington, or Yamhill Counties), OR Remainder (all other counties), or Rest of the World, including international trips to Canada or Mexico. This classification system meant that flows into, out of, internal, and through Oregon could be summarized.

In addition to summarizing data by the direction of the flow, a series of corridors within the state were identified (Figure 1). Appendix A contains the detailed methodology used to map the origin-destination pairs to the corridor system. Each record's tonnage

or carloads was summarized along all of the corridors used by that flow. For example, a record showing an origin in Eastern Oregon and a destination in Hood River would be counted on both the Hermiston/Idaho corridor and the Portland/Hermiston corridor. Or, if the destination was Portland, it would also be counted on the Portland Area corridor. This provided a way to do a quick summary showing the relative importance of the different rail corridors in the state.

Figure 1: Oregon Rail Corridor Network ranked in order by Density(coastal lines grouped as a single corridor)



Summary of Statewide Commodity Flow Findings

Overall the results of the analysis show a gradual increase of flows over time. The pattern of growth between Carloads and Tons is very similar. There is a small decline between 2000 and 2003, followed by an increase between 2003 and 2005.

Figure 2: Carloads (1986 to 2007)

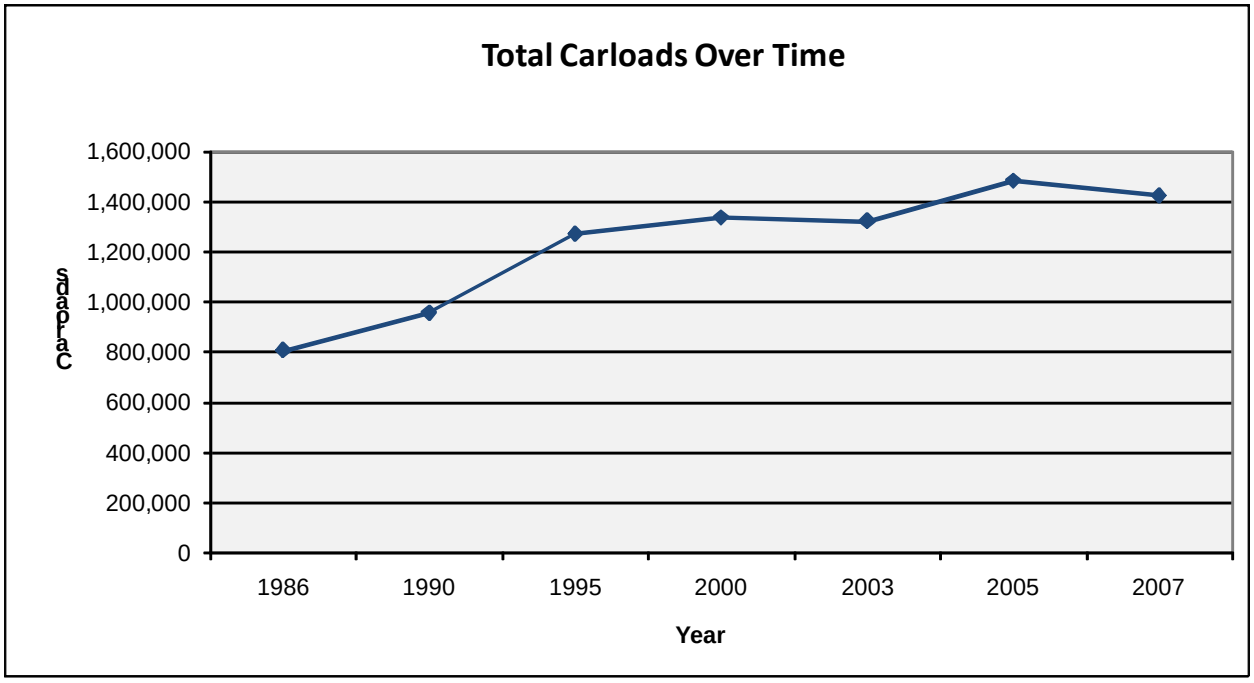
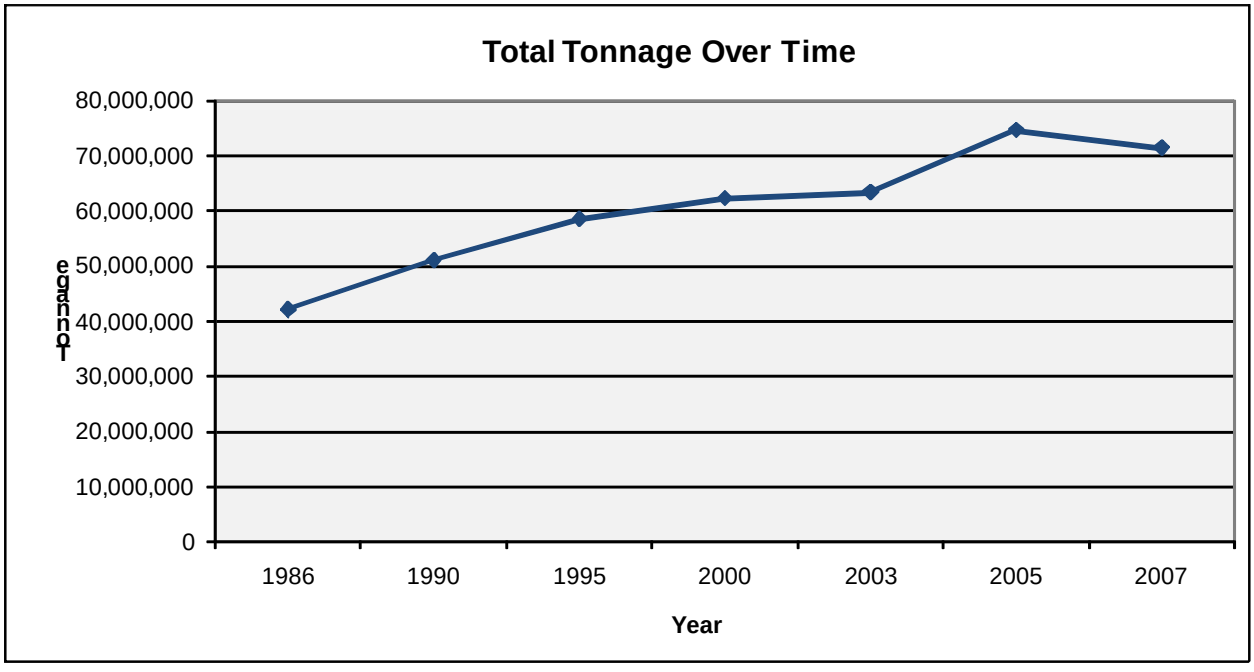


Figure 3: Tonnage (1986 to 2007)



In addition to summarizing the totals, the results were summarized by the origin and destination groupings; results are shown in Figures 4 and 5. Figure 4 shows the carload flows. The largest carload flows in 2007 are through the state of Oregon, meaning that the origin and destination are not within Oregon. A shipment that begins in Seattle and ends in Sacramento would be a through flow, for example. The next largest carload flow is from outside of Oregon to Portland, followed by the reverse flow. The next largest flows in 2007 were from outside of Oregon with destinations in Oregon, outside of the Portland-area, followed by the reverse. The other flow patterns in 2007 (internal Oregon flows) were the smallest.

The tonnage flows in 2007 are shown in Figure 5, and the results are very similar to the carloads. The exception is the third largest tonnage flow is from Oregon, outside of the Portland-area, to destinations outside of Oregon, and the fourth largest flow is the reverse.

Figures 4 and 5 show that there have been changes in the dominant flows throughout the study period, most notably the flows from Oregon (outside of Portland) to regions outside of Oregon which used to be the second largest flow, declined behind the Portland flows in the late 1980's. That flow pattern has a slight net decrease, while the others have grown from 1986. Through flows have a very large growth spike from 2003 to 2005 then decreased slightly in 2007.

Figure 4: Carloads by Direction of Flow (1986 to 2007)

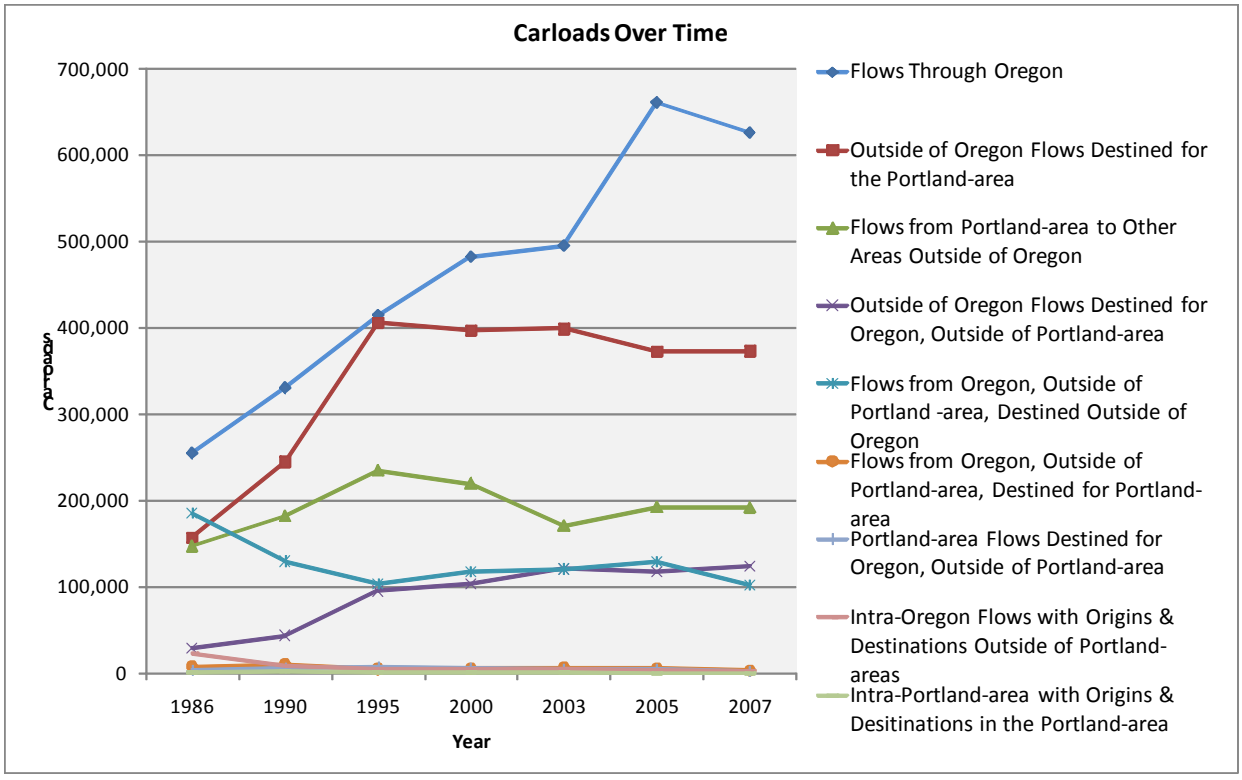
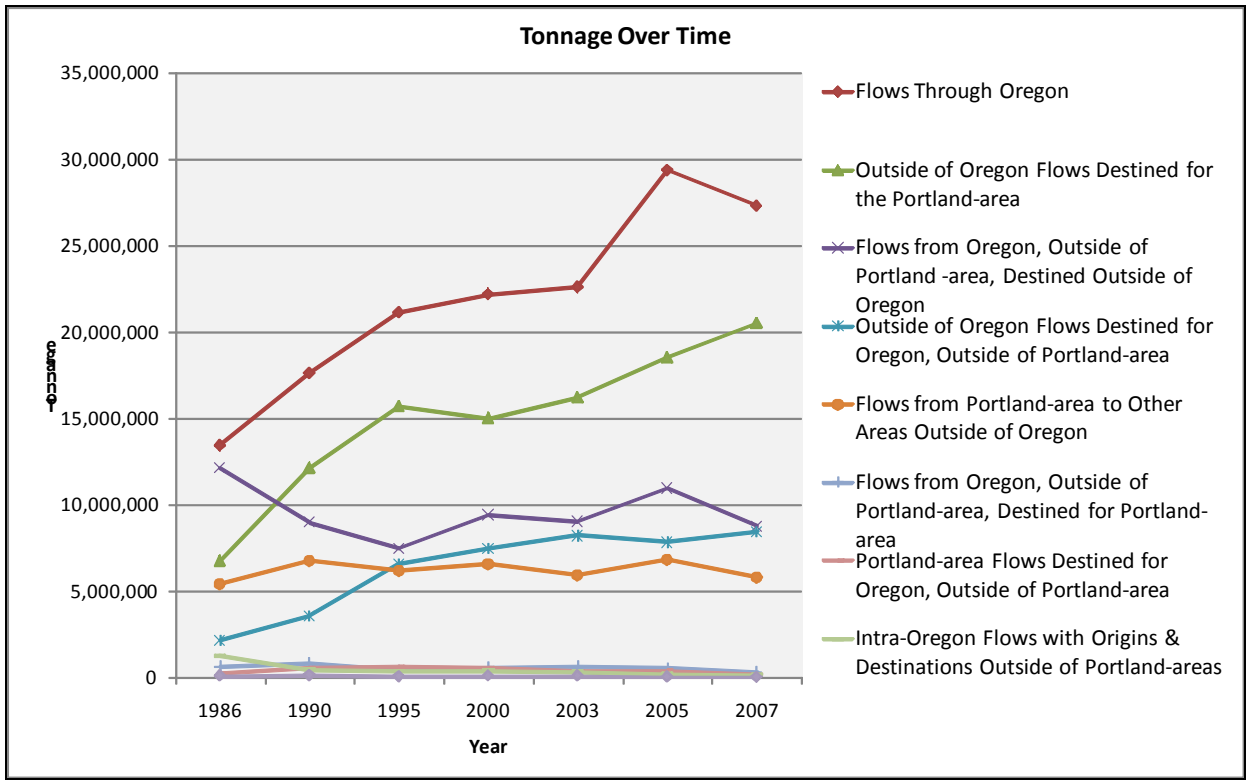


Figure 5: Tonnage by Direction of Flow (1986 to 2007)



The corridor flows are shown in Figures 6 and 7. The Portland/Washington, Portland/Hermiston, and The Dalles/Chemult corridors show a large increase in traffic between 1996 and 2000. Then the traffic levels off in the year 2000 and declines slightly in 2007. The Hermiston/Spokane and Hermiston/Idaho corridors show a decrease between 2001 and 2002 in tonnage but hold steady in carloads. Due to the nature of the summary by corridors, these numbers are not meant to be interpreted as straight values, but should be interpreted as showing the relative importance of the different corridors based solely on the amount of goods transported. The change in these results over time shows that different origin and destination pairs are being utilized in different years.

Figure 6: Corridor Carloads (1986 to 2007)

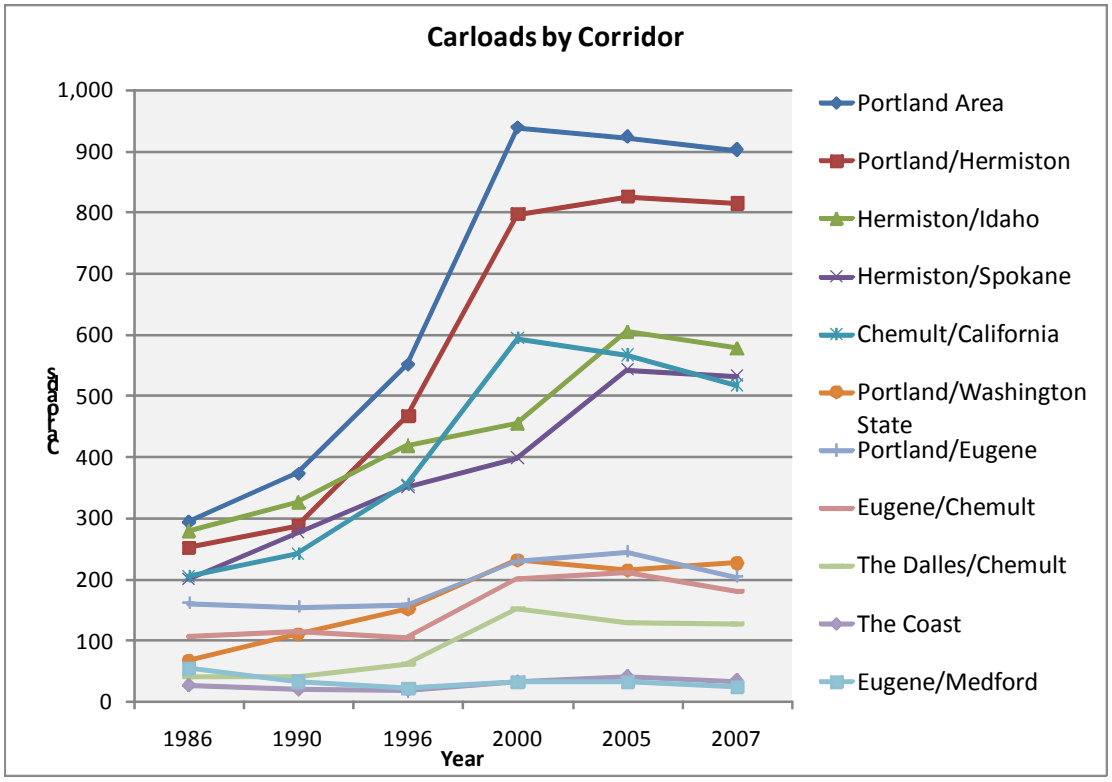
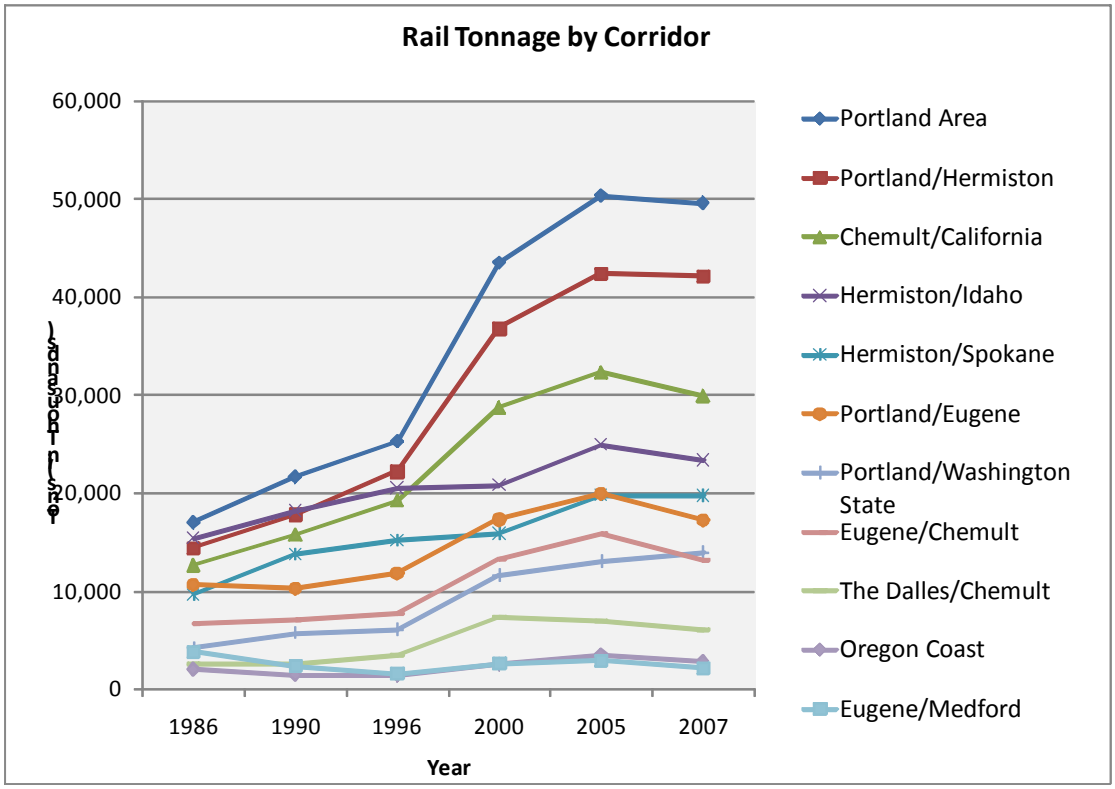


Figure 7: Corridor Tonnage (1986 to 2007)



Analysis of the results by Commodity shows that the dominant goods moved throughout the study period are lumber, farm products, chemicals, pulp, and food products. Farm products and lumber products have traded places between the first and second ranking during the study period, but they are the most dominant of any commodity. All other commodities outside of the top 10 have a very small share of the total.

Figure 8: Top 10 Commodities in 2007

Commodity	Carloads	Tons	Percent of Total
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%

Figure 9: Top 10 Commodities in 2000

Commodity	Carloads	Tons	Percent of Total
Lumber or wood products, excluding furniture	184,054	14,125,580	23%
Farm products	94,175	8,789,609	14%
Chemicals or allied products	70,014	6,524,471	10%
Miscellaneous mixed shipments	386,772	6,231,720	10%
Pulp, paper, or allied products	91,556	5,299,172	9%
Food and kindred products	66,516	4,215,813	7%
Other Waste	55,988	2,791,040	4%
Waste or scrap materials	57,416	2,664,532	4%
Primary metal products	29,860	2,405,428	4%
Coal	19,376	2,292,521	4%

Figure 10: Top 10 Commodities in 1995

Commodity	Carloads	Tons	Percent of Total
Farm products	158,573	14,646,728	25%
Lumber or wood products, excluding furniture	139,160	9,470,224	16%
Miscellaneous mixed shipments	379,081	5,894,586	10%
Chemicals or allied products	54,165	4,972,077	8%
Pulp, paper, or allied products	84,936	4,971,876	8%
Food and kindred products	67,166	3,904,110	7%
Other Waste	71,374	3,089,726	5%
Waste or scrap materials	54,153	2,299,475	4%
Coal	16,943	1,819,941	3%
Primary metal products	21,944	1,732,408	3%

Figure 11: Top 10 Commodities in 1990

Commodity	Carloads	Tons	Percent of Total
Farm products	123,288	11,259,952	22%
Lumber or wood products, excluding furniture	167,795	11,055,662	22%
Pulp, paper, or allied products	90,144	5,138,920	10%
Miscellaneous mixed shipments	224,892	4,941,616	10%
Chemicals or allied products	38,756	3,453,724	7%
Food and kindred products	53,460	2,978,880	6%
Other Waste	45,976	2,218,819	4%
Primary metal products	24,756	1,959,272	4%
Clay, concrete, glass, or stone products	16,244	1,321,976	3%
Waste or scrap materials	20,836	1,168,020	2%

Figure 12: Top 10 Commodities in 1986

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%

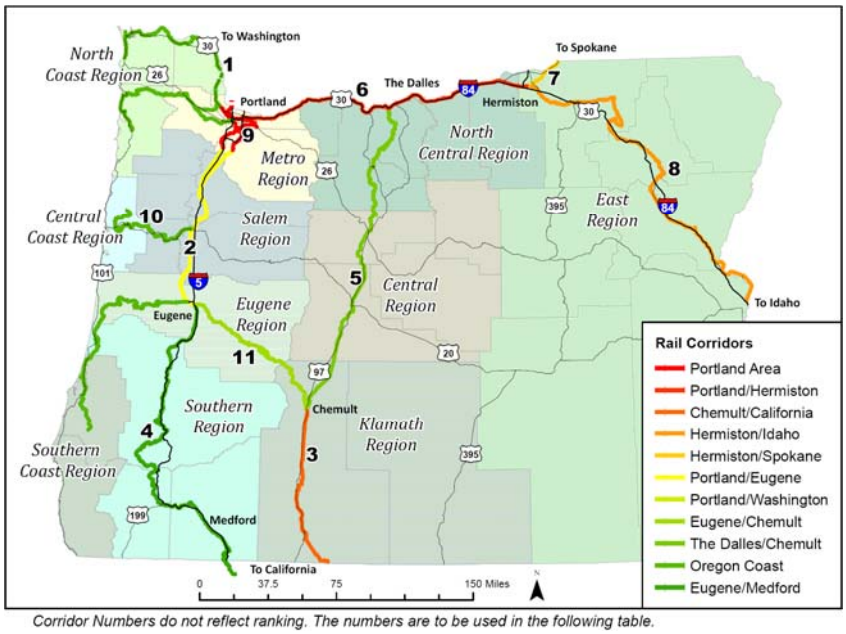
Conclusions

Analysis of the Rail Waybill data provides a good look at the state of freight rail movements in Oregon today and over the past twenty years. This analysis has highlighted the dominant corridors and movements as well as commodities. Oregon's major freight rail commodities are lumber and farm products. The largest movement of freight rail throughout the state of Oregon neither originates nor terminates within the state, meaning that Oregon's rail network is of high importance to other states. Within Oregon, Portland is the major trip end for freight movements.

The plots of the tonnage and carloads over time show that, while there has been growth since the mid-1980s, most of that growth occurred during the 1990s. There was growth in tonnage and carloads from the year 2003 to 2005, which appears to be mostly due to flows through the state of Oregon, followed by a slight decrease from 2005 to 2007. The reasons for this growth decline should be investigated. Fuel price increases from the year 2008 are not yet captured in the available data, but should be included in this analysis when that year is released by the Surface Transportation Board.

Appendix A: Rail Corridors

This appendix describes the process used to aggregate rail flows to corridors shown below. The rail origin-destination tonnages were assigned to the Oregon rail network. A rail corridor tonnage flow was counted in the origin corridor, destination corridor, and the corridors it had to traverse to reach its terminus.



Corridor Numbers do not reflect ranking. The numbers are to be used in the following table.

Table 1 summarizes the corridors assigned to each origin-destination flow. For the BNSF line, the regions outside of Oregon were defined as follows:

- BNSFNW: British Columbia, Saskatchewan, Alberta, and Washington State
- BNSFSW: California, Arizona, Nevada, New Mexico, Utah
- BNSFEAST: All other states and provinces

For the UPRR line, the regions out of Oregon were defined as follows:

- UPNW: Washington
- UPSW: California, Arizona, Nevada, New Mexico
- UPCAN: All Canadian Provinces
- UPEAST: All other US States

Inside of Oregon, each FSAC code tied a station to the corridor it falls into.

It was not possible to tie the 'through' flows between California and Canada to a specific corridor because there are two different corridors rail could travel on to enter the state from the north. Modal experts determined the following assumption for the split flows from or to Canada: 25 percent of flows travel on Corridor 1 versus 75 percent on Corridor 7. Once the tonnage flowing through the state from the NW to the SW was summarized, the through tonnage was multiplied by 25 percent and added to Corridors 1 and 5, and multiplied by 75 percent and added to Corridors 7 and 6. Corridors 9, 2, 11, and 3 received all of tonnage because they are the common corridors through the state for both entry corridors.

Table 1: Rail Corridor Flows

Origin-Destination 1	Origin-Destination 2	Corridors Traveled					
BNSFNW	2	1	2	9			
BNSFNW	9	1	9				
BNSFNW	5	1	9	5	6		
BNSFNW	3	1	9	5	6		
BNSFNW	10	1	9	10			
BNSFNW	BNSFSW	1	5	3	6		
BNSFSW	3	3					
BNSFSW	5	3	5				
BNSFSW	9	3	5	6	9		
BNSFSW	2	3	5	6	9	2	
BNSFSW	10	3	5	6	9	10	
BNSFEAST	9	6	9				
BNSFEAST	2	6	9	2			
BNSFEAST	10	6	9	10			
UPNW	9	1	9				
UPNW	2	1	9	2			
UPNW	3	1	9	2	3	11	
UPNW	4	1	9	2	4		
UPNW	5	1	9	6	5		
UPNW	6	1	9	6			
UPNW	7	1	9	6	7		
UPNW	8	1	9	6	8		
UPSW	9	3	2	9			
UPSW	2	3	2				
UPSW	3	3					
UPSW	4	3	4				
UPSW	5	3	2	9	6	5	
UPSW	6	3	2	9	6	11	
UPSW	7	2	3	9	6	7	11
UPSW	8	2	3	9	6	8	11
UPCAN	9	7	6	9			
UPCAN	2	7	6	9	2		
UPCAN	3	7	6	9	2	3	11
UPCAN	4	7	6	9	2	4	
UPCAN	5	7	6	5			
UPCAN	6	7	6				
UPCAN	7	7					
UPCAN	8	7	8				
UPEAST	9	8	6	9			
UPEAST	2	8	6	9	2		
UPEAST	3	8	6	9	2	4	11
UPEAST	4	8	6	9	2	4	
UPEAST	5	8	6	5			
UPEAST	6	8	6				
UPEAST	7	8	7				
UPEAST	8	8					