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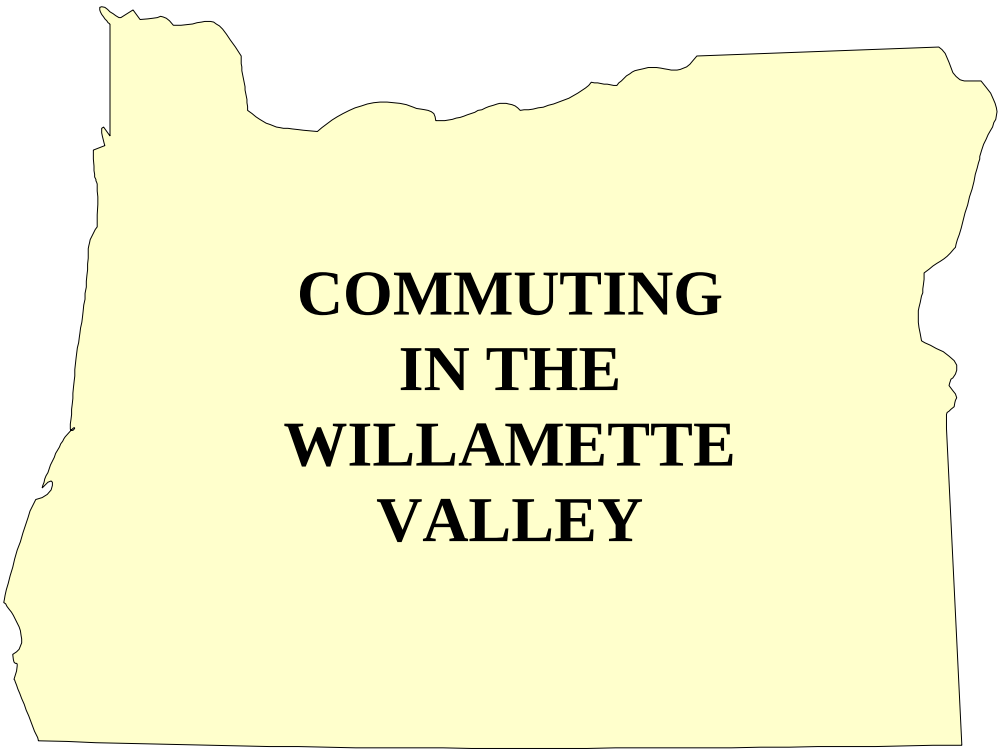

COMMUTING IN THE WILLAMETTE VALLEY

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EXECUTIVE SUMMARY

Reasons for the Study

A study of commuting in the Willamette Valley is important for a number of reasons. The Willamette Valley contains Oregon's largest urban centers and over 70 percent of the state's population. Over the past 20 years, the population of the valley has grown by over a half million. Vehicular travel has increased significantly as well. Total vehicle miles traveled (VMT) increased by over 100% and VMT per capita increased by over 50% from 1975 to 1995. The increase in travel has put greater demands on valley roads, particularly freeways. Willamette Valley residents, especially those living in the Portland metropolitan area, are worried about traffic congestion.

People have varying perceptions about commuting in the Willamette Valley: what is happening, why is it happening, and what are the implications for transportation and growth management? The purpose of this study is to use readily available data from the Census and other sources to describe and explain commuter patterns in the valley.

Study Data Sources

The study used data from the 1990 Census Transportation Planning Package (CTPP) to evaluate county-to-county commuting patterns, commuter flows to the major employment centers in the valley, commuter travel on I-5, and relationships between travel time, jobs-housing balance, and commuting. The 1990 data was updated to provide estimates of 1996 commuter travel using estimates of population and employment increases since 1990.

This report frequently refers to 'metropolitan areas'. This means the urban job centers of the Portland, Salem – Keizer, and Eugene – Springfield metropolitan areas identified in *Figure 3*.

Study Conclusions

The results of this research demonstrate the strength of the relationship between commuting and accessibility to employment. This relationship may seem obvious, but it is often overlooked or underestimated in discussions about commuting behavior. Most jobs are located in a few major urban job centers and most people are unwilling to commute long distances. Therefore intercity commuting is greatest in the vicinity of the major job centers. Cities that are nearest the major job centers are attractive places to live and the majority of their residents will commute to external job locations, even in cities that have more jobs than employed residents. The following findings support this overall theme.

Most people are unwilling to make long commutes. Less than 15% of Willamette Valley workers have commutes that are longer than 30 minutes.

Most commuters work in the county where they live and most inter-county commuting takes place in the Portland metropolitan area. Nearly three quarters of commuters work in the county where they reside. Over 70% of the commuters who live and work in different counties live and work in Clackamas, Multnomah or Washington Counties.

Most jobs and most of the commuting take place in the Portland metropolitan area. 63% of all jobs in the Willamette Valley are in Clackamas, Multnomah and Washington Counties and 62% of commuters live in these counties.

Long distance intercity commuters contribute relatively little to congestion in the Portland metropolitan area. Commuter flows from outside of the Portland metropolitan area are very small compared to flows between portions of the Portland metropolitan area. For example, the sum of all commuters who might use I-5 to commute to Portland from counties outside of the Portland metropolitan area is about the same number as the number of commuters traveling from parts of Multnomah County outside the Portland metropolitan area.

I-5 is not the dominant corridor for intercity commuting. The predominant commuting flows are across the valley to major employment centers, not up and down the valley between employment centers. The magnitude and direction of intercity flows indicates that higher flows occur in directions served by corridors other than I-5. For example, more people commuted into Portland from the east (27,000) and west (49,000) than commuted in from the south on I-5 (16,000) in 1990. The same commuting pattern is present around the Salem – Keizer metropolitan area and the Albany and Corvallis urban areas.

Portland is the dominant destination for commuters using I-5. Commuter flows into Portland are much higher than commuter flows into the other major job center.

The greatest needs for actions to provide commuter services and to reduce the number of single occupancy commuters are present within and near the urban job centers. The need for providing services to long-distance commuters is small in comparison. Reducing the valley-wide drive-alone rate to the low level found in the city of Portland (65%) might reduce the total number of peak hour vehicles in the Willamette Valley by 56,000. Most of the potential for reduction would be among commuters who commute to destinations within the metropolitan area, city, or county where they live.

- 69% of the people removed from the roadway system would be workers who commute within the major urban job centers.
- 15% would be workers who commute to the Portland metropolitan area from elsewhere in Multnomah, Clackamas and Washington counties.
- 9% would be workers who commute to urban areas within the county where they reside.
- 7% would involve intercounty commuters outside of the Portland tri-county area.

Reductions in intercity commuting are likely to have fairly small effects on I-5 traffic congestion. Reducing the drive-alone rate for intercity commuters to 65% might free up about 5% of I-5's capacity over most of its length. To the north of Woodburn, such a reduction might free up about 9% of the freeway's capacity.

Intercity commuting in the Willamette Valley is driven in large part by proximity to the major employment centers in the valley. The major centers and the cities most isolated from them have the highest percentages of internal commuting (>65%). The cities that are located nearest the major job centers have the lowest rates of internal commuting (35% or below).

Overall jobs-housing balance appears to have little effect on commuting. Only among cities located near the major employment centers, does there appear to be a relationship between the ratio of jobs to workers in a city and the amount of intercity travel. Even for those cities it appears to be weak. More study is needed to determine the amount of effect and the potential consequences of public actions to alter jobs-housing balance.

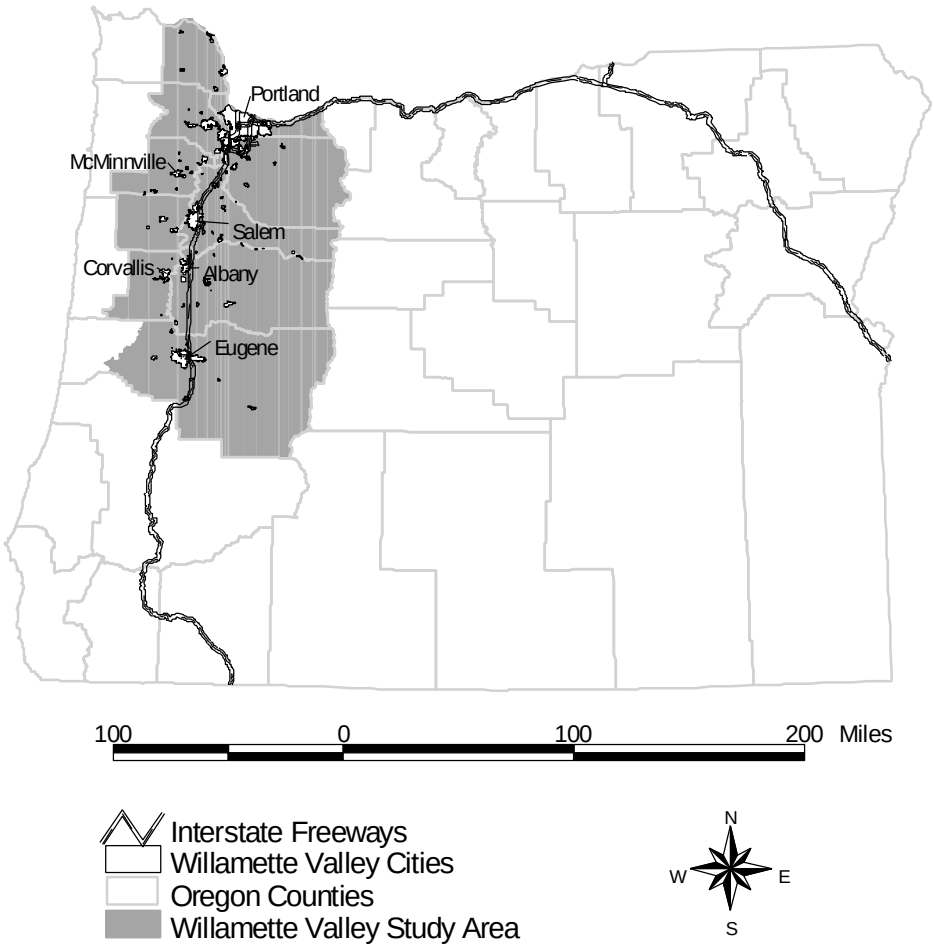
INTRODUCTION AND SUMMARY

Background and Study Purpose

The Willamette Valley is the broad, fertile valley of the Willamette River located in the northwestern part of Oregon. The Willamette River originates in Oregon's Cascade and Coast mountain ranges about 150 miles to the south of its confluence with the Columbia River. The broad valley bottom has much of Oregon's most fertile farmland and most of Oregon's population.

The study area is a ten-county region that includes most of the watershed for the Willamette River. This area extends from Columbia County on the north to Lane County on the south and from the Cascade Mountains on the east to the Coast Range on the west (*Figure 1*).

Figure 1
Willamette Valley Study Area



Three of the state's metropolitan areas and 70% of the state's population are located in the Willamette Valley. The Portland metropolitan area is situated at the northern end of the valley. The Salem-Keizer metropolitan area is located about 50 miles to the south of Portland. The Eugene-Springfield metropolitan area is located near the southern end of the valley. By 2020, the population of valley is expected to exceed three million.[1]

Oregonians are concerned about population growth in the Willamette Valley and its effects on urban growth and livability, air and water quality, and farm and forestlands. Transportation has strong relationships to these concerns. It accounts for a large share of energy consumption and air pollution. It affects the distribution of population and economic activities. Traffic congestion affects public perceptions of livability. Some specific concerns relating to commuting include:

- The effect of intercity commuting on efforts of metropolitan areas to control the growth of vehicular travel.
- The effect of state highway improvements on the growth of urban fringe areas and satellite cities.
- The effect of urban growth controls on housing price and availability and the potential effect on intercity commuting.
- The effect of commuting on state highway congestion, particularly Interstate 5.

Over the past 20 years, from 1976 to 1996, the population of the Willamette Valley grew by over a half million. Vehicular travel has increased significantly as well (*Figure 2*). Total vehicle miles traveled (VMT) increased by over 100% from 1975 to 1995. For that same period of time, VMT per capita increased by about 51%. Since 1988, population growth has primarily been responsible for rising VMT.

Growth of population and vehicle-miles traveled has increased the pressure on the roadway system in both urban and rural areas, particularly on freeways. Willamette Valley residents, especially those living in the Portland metropolitan area, are worried about traffic congestion. (*Table 1*).

Commuting travel is a significant component of all vehicular travel; 28% of all trips and 35% of vehicle miles traveled are due to commuting.[2] The effect of commuting on the highway system is even greater than these percentages imply because commute travel is concentrated in relatively narrow daily time periods. Moreover, commuters generate additional trips during congestion peaks because they often link their trips to and from work with other activities such as dropping children off at day care or purchasing groceries. Trip linking has increased over the past several decades as the number of multiple worker households has increased.

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[1] Oregon Department of Administrative Services, Office of Economic Analysis. "Long-Term Population and Employment Forecasts for Oregon". January, 1997.

[2] US Department of Transportation. "National Personal Transportation Survey, 1990 NPTS Databook Volume II". Table 5.11.

Figure 2
Indexed Trends in VMT and Per Capita VMT for the Willamette Valley
1975 - 1995
Source: ODOT & Center for Population Research and Census

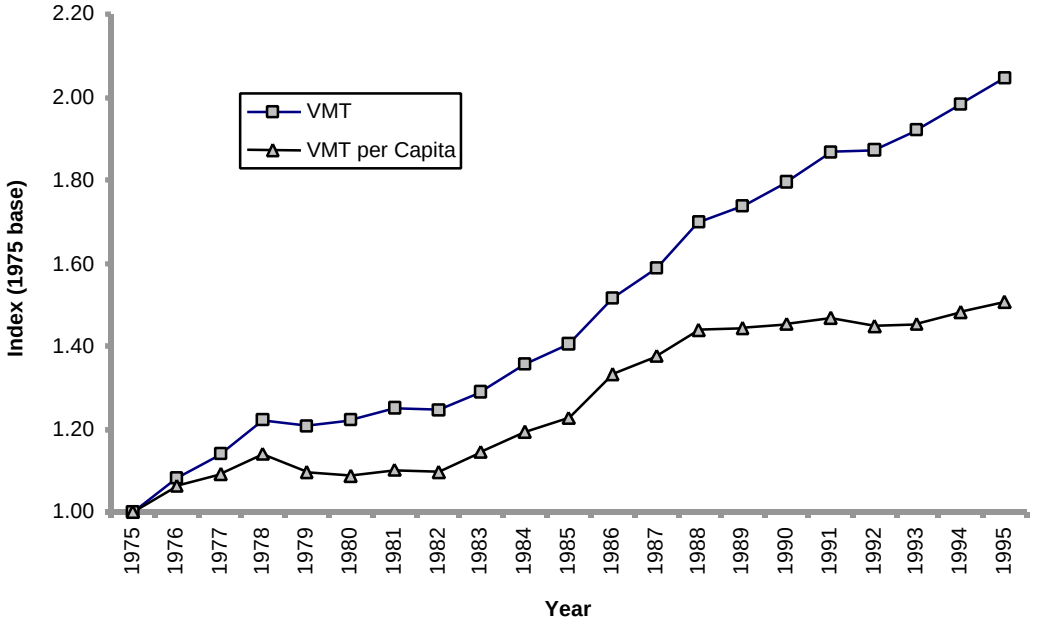

Table 1
Perceptions of Congestion in the Willamette Valley

View of Congestion Problem	Portland Metro Counties		Other Valley Counties		All Willamette Valley Counties	
	Count	Percent	Count	Percent	Count	Percent
Critical	202	9%	62	4%	264	7%
Very serious	571	26%	198	14%	769	21%
Moderate	898	41%	571	40%	1469	40%
Small problem	228	10%	243	17%	471	13%
Not a problem	289	13%	369	26%	658	18%
Total	2188	100%	1443	100%	3631	100%

Commuting travel is also an important market for car pooling, van pooling, and other types of passenger transportation services. Because commuters make relatively consistent decisions on a daily basis about destination, mode, time of travel and choice of route, their trips are easier to consolidate. Moreover, the connection of these trips to job sites increases the potential for coordinating ridesharing through employers. For long distance commuting, the difference in perceived travel costs of riders and drivers creates

significant incentives for commuters to use public transportation or share driving with other commuters.[3]

Understanding commuter travel is also important to urban growth management efforts. Oregon's present highway system provides high levels of mobility. This has enabled residents to make choices about where they live and work that would have been difficult or impossible without the present highway system. People can change jobs without uprooting their families. The wage earners in two-income households have more opportunities to pursue better paying and more interesting work because their jobs do not have to be located in the community where they live. These opportunities also affect urban and rural growth and development. Since people don't have to live near their jobs, greater pressures occur for development at the periphery of metropolitan areas and in surrounding cities located within reasonable commuting distances.

The purpose of this study is to provide an overview of commuting patterns in the Willamette Valley to help answer questions such as:

- What are the magnitudes and directions of commuter flows?
- What is the relative contribution of commuter travel to traffic and congestion on Interstate 5?
- What is the potential for relieving congestion on Interstate 5 by reducing the number of drive-alone commuters?
- What are the relationships between satellite cities, intercity commuting and jobs/housing balance?

Study Methodology

Data from the 1990 Census Transportation Planning Package (CTPP) was used to describe commuter flows. The CTPP provides a wealth of information on commuters and commuter travel. The CTPP databases were used to evaluate commuter travel at the county level, minor civil division level, and Census place level.[4]

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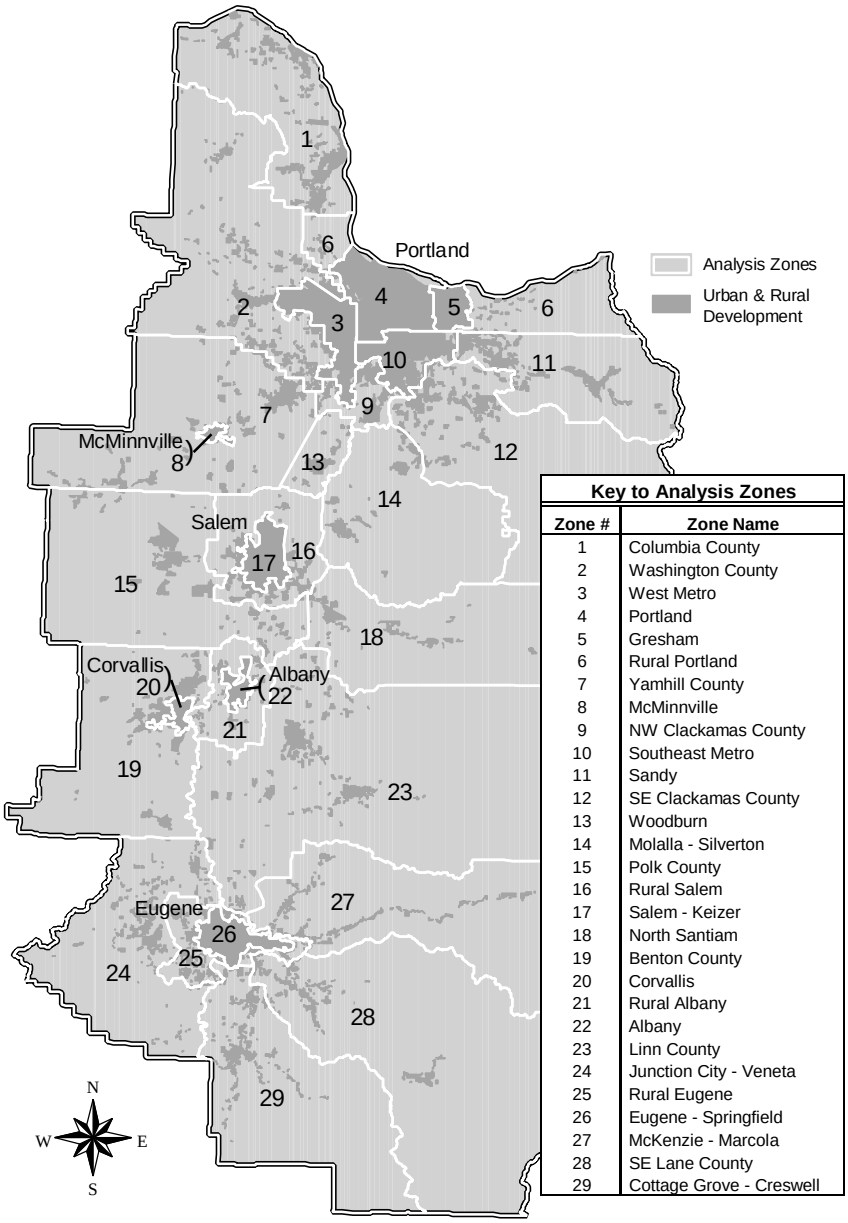
[3] The estimated hourly value of driving is 60% of the average wage rate; for riding as a passenger it is 45% of the average wage rate. In 1990 the average wage rate was about $10 an hour. Therefore, at 1990 rates, riding as a passenger rather than as a driver would save about $1.50 an hour. This is not much of an incentive for shorter commutes since travel times are low and a large percentage of additional travel time may be necessary to consolidate travelers. For long commutes, the savings can be significant since travel times are high and consolidating travelers can be a small addition to the total trip time. Source for value of time information: U.S. Department of Transportation, "Estimating the Impacts of Transportation Alternatives" NHI Course No. 15257

[4] Minor civil divisions are aggregations of census tracts. Census places include all but the smallest incorporated cities. The data were taken from the summary level STCO/MCD/Place Part C of the CTPP. For this study, commuters were defined as all workers who work outside of their homes. This is a broad definition, but it is clear cut and it allows Census data to be used directly. Using this definition eliminated the need for reclassifying data and reduced the potential for errors as a result.

The study area was divided into 29 zones to aid in the analysis and display of data. The zones included the major employment centers of the valley (Portland metro area, Salem – Keizer metro area, Eugene – Springfield metro area, Corvallis, Albany, McMinnville) and outlying 'commuter-sheds'. Because of its size, the Portland metropolitan area was divided into four zones (Portland, West Metro, Southeast Metro, Gresham). (*Figure 3)*

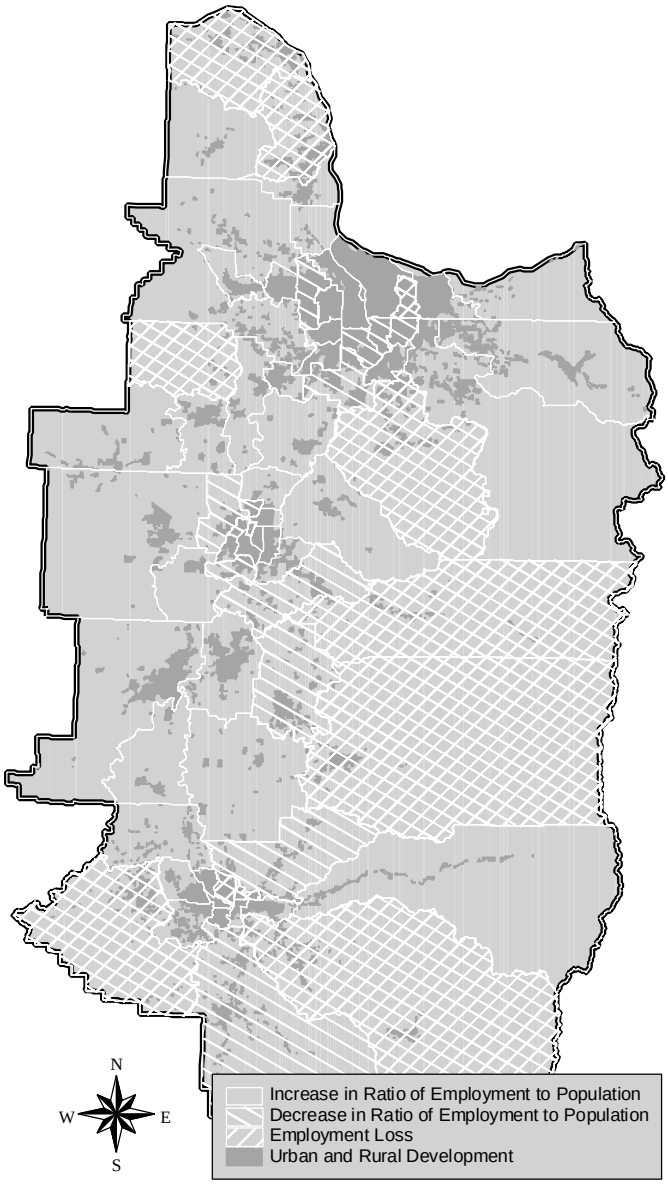
Figure 3
Analysis Zones



Key to Analysis Zones	
Zone #	**Zone Name**
1	Columbia County
2	Washington County
3	West Metro
4	Portland
5	Gresham
6	Rural Portland
7	Yamhill County
8	McMinnville
9	NW Clackamas County
10	Southeast Metro
11	Sandy
12	SE Clackamas County
13	Woodburn
14	Molalla - Silverton
15	Polk County
16	Rural Salem
17	Salem - Keizer
18	North Santiam
19	Benton County
20	Corvallis
21	Rural Albany
22	Albany
23	Linn County
24	Junction City - Veneta
25	Rural Eugene
26	Eugene - Springfield
27	McKenzie - Marcola
28	SE Lane County
29	Cottage Grove - Creswell

Although the 1990 CTPP provides the best data of commuting patterns in the Willamette Valley, the information it provides has become dated. Oregon's population and employment has grown markedly since 1990. Changes in population and employment undoubtedly have affected the distribution of commuting. *Figure 4* shows relative changes in population and employment from 1990 to 1996.

Figure 4
Changes in Employment and Population, 1990 - 1996



One might expect commuting to have increased between areas where the ratio of employment to population declined and areas where the ratio increased, but changes in commute patterns resulting from population and employment changes were undoubtedly more complex. For example, some changes in population to employment ratios may have been due to demographic changes such as an increase in the proportion of retirees in an area. Moreover, "cross-commuting" occurs between places regardless of the ratios of employment and population.

It should be noted that a number of areas that experienced declining ratios of employment to population also experienced a decline in employment. The areas where this occurred are located predominantly in the mountainous fringe of the Willamette Valley where timber-based industries have declined. The remaining areas where population grew faster than employment were located around the fringe of major job centers. In these areas, the change in the ratio may have been due to growth of 'bedroom-communities' and rural residential areas.

Despite their age, the 1990 census data are useful for describing the relative magnitude of commuter flows, particularly for larger flows where changes in employment and population were unlikely to have significantly affected the relative sizes of commuter flows. Caution is advised in drawing conclusions about the smaller commuter flows based on the 1990 data because the relative sizes of these are more likely to have been affected by changes in the distribution of population and employment.

To provide a more contemporary picture of commuting in the Willamette Valley, 1996 estimates of commuter flows were developed from the 1990 data and estimates of population and employment growth from 1990 to 1996. The 1996 estimates were used to evaluate the effects of intercity commuting on I-5 traffic congestion. They were also used in a sensitivity analysis to estimate the potential market for commuter services and to evaluate the effects of commuter reductions on congestion.

Following are summaries of commuting patterns to the three metropolitan areas (Portland, Salem, Eugene) and to Albany and Corvallis.[5] A summary is not provided for McMinnville because very few commuters to that city live outside of Yamhill County.

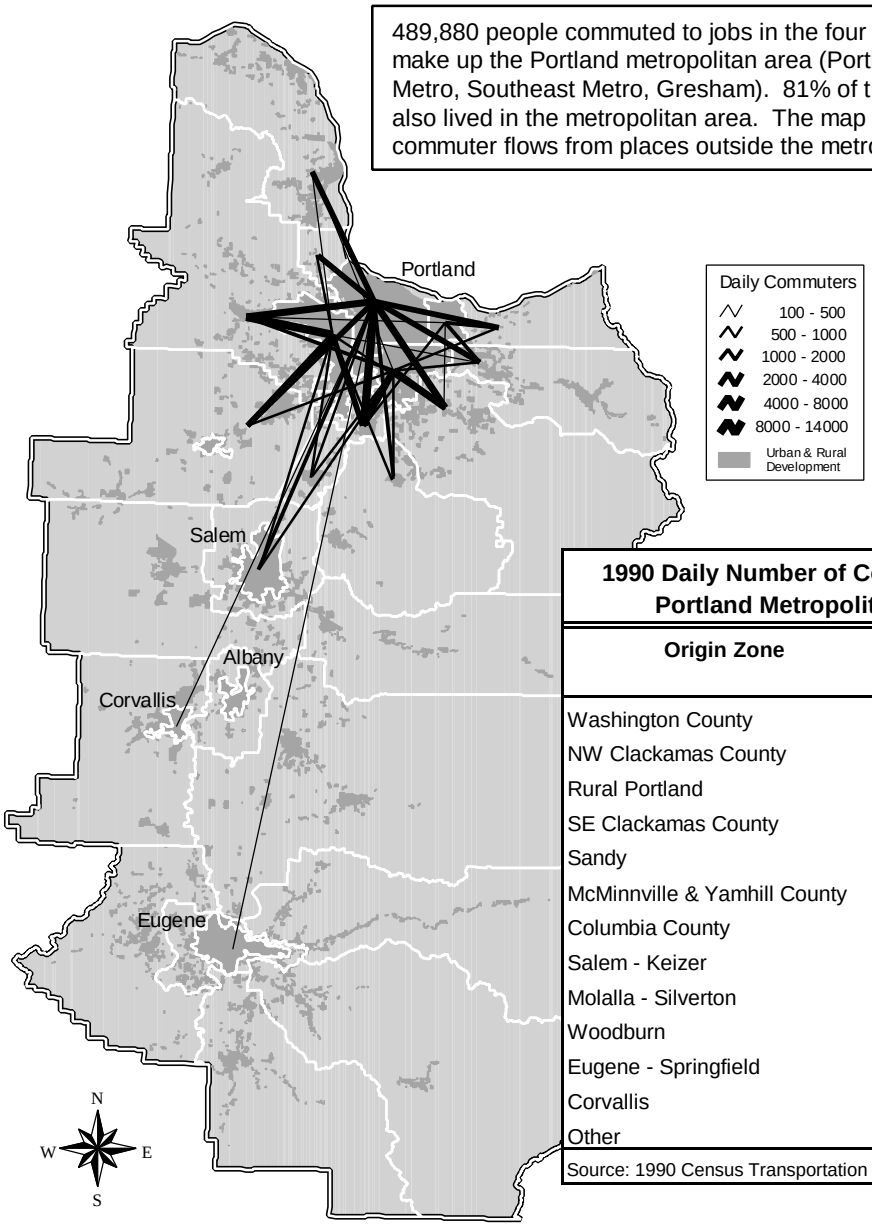
[5] The term 'metropolitan areas' used in this report refers only to the urban job centers of the Portland, Salem - Keizer, and Eugene – Springfield metropolitan areas identified in Figure 3 and not to the entire counties that these job centers are a part of.

Summary of Commuting to the Portland Metropolitan Area in 1990

69% of all jobs located in the main Willamette Valley job centers were in the Portland metropolitan area. Over 40% of all jobs were located in the City of Portland. Although 81% of metropolitan area jobs were filled by workers who live within the metropolitan area (a higher percentage than for any of the other job centers), the sheer size of the metropolitan job market attracted commuters from all over the Willamette Valley. Over 75% of the external commuters lived in Clackamas, Multnomah and Washington Counties but over 19,000 (21%) resided elsewhere in the Willamette Valley.

Figure 5
1990 Commutes to Portland Metropolitan Area Job Centers

489,880 people commuted to jobs in the four job centers that make up the Portland metropolitan area (Portland, West Metro, Southeast Metro, Gresham). 81% of those workers also lived in the metropolitan area. The map and table show commuter flows from places outside the metropolitan area.



1990 Daily Number of Commuters to Portland Metropolitan Area

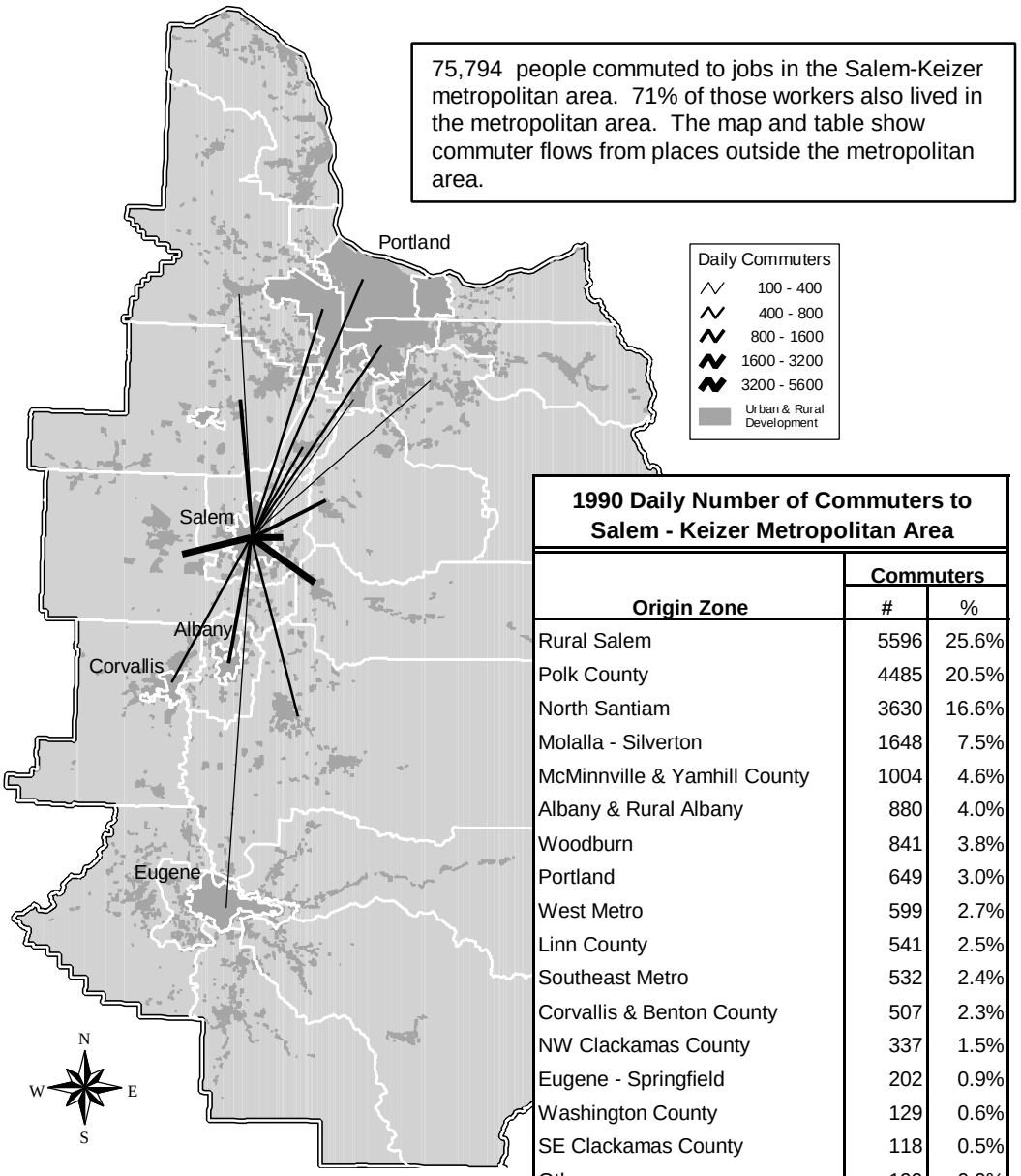
Origin Zone	Commuters	
	#	%
Washington County	22984	25.3%
NW Clackamas County	22432	24.7%
Rural Portland	10286	11.3%
SE Clackamas County	10124	11.1%
Sandy	5841	6.4%
McMinnville & Yamhill County	5658	6.2%
Columbia County	3592	3.9%
Salem - Keizer	2806	3.1%
Molalla - Silverton	2752	3.0%
Woodburn	2636	2.9%
Eugene - Springfield	377	0.4%
Corvallis	203	0.2%
Other	1257	1.4%

Source: 1990 Census Transportation Planning Package

Summary of Commuting to the Salem – Keizer Area in 1990

The Salem – Keizer metropolitan area attracted commuters primarily from Marion and Polk Counties. 71% of the commuters lived within the metropolitan area. 74% of the external commuters lived elsewhere in Marion and Polk Counties. Of the longer distance commuters, the largest number came from Linn, Clackamas and Yamhill Counties.

Figure 6
1990 Commutes to Salem – Keizer



1990 Daily Number of Commuters to Salem - Keizer Metropolitan Area

Origin Zone	Commuters #	Commuters %
Rural Salem	5596	25.6%
Polk County	4485	20.5%
North Santiam	3630	16.6%
Molalla - Silverton	1648	7.5%
McMinnville & Yamhill County	1004	4.6%
Albany & Rural Albany	880	4.0%
Woodburn	841	3.8%
Portland	649	3.0%
West Metro	599	2.7%
Linn County	541	2.5%
Southeast Metro	532	2.4%
Corvallis & Benton County	507	2.3%
NW Clackamas County	337	1.5%
Eugene - Springfield	202	0.9%
Washington County	129	0.6%
SE Clackamas County	118	0.5%
Other	199	0.9%

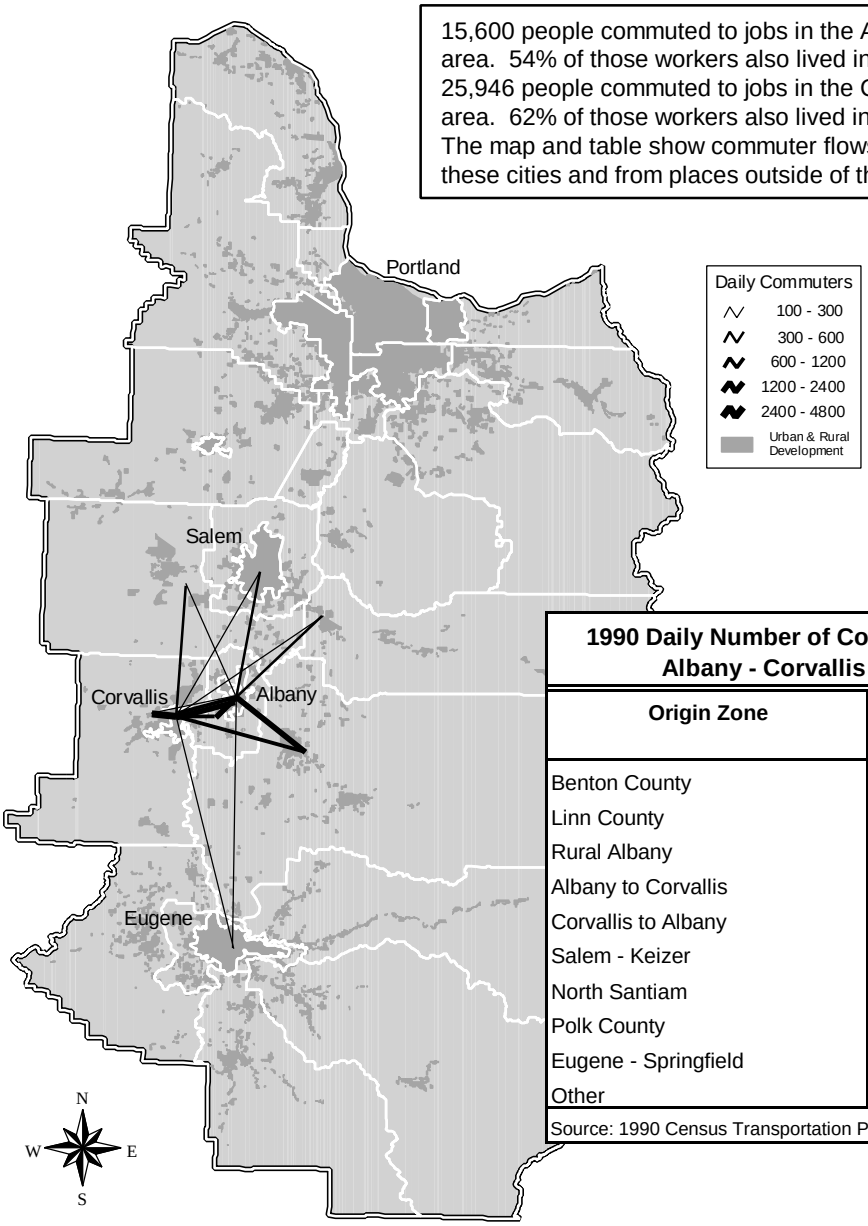
Source: 1990 Census Transportation Planning Package

Summary of Commutes to Albany and Corvallis in 1990

Corvallis is the stronger job center of this pair of cities providing about two-thirds more jobs than Albany. Both cities attracted commuters primarily from each other or from elsewhere in Benton and Linn Counties. Together, these cities had the smallest proportions of commuters who lived in the job centers where they worked. Over 3000 workers commuted between the cities.

Figure 7
1990 Commutes to Albany and Corvallis

15,600 people commuted to jobs in the Albany urban area. 54% of those workers also lived in Albany.
25,946 people commuted to jobs in the Corvallis urban area. 62% of those workers also lived in Corvallis.
The map and table show commuter flows between these cities and from places outside of them.



1990 Daily Number of Commuters to Albany - Corvallis Area

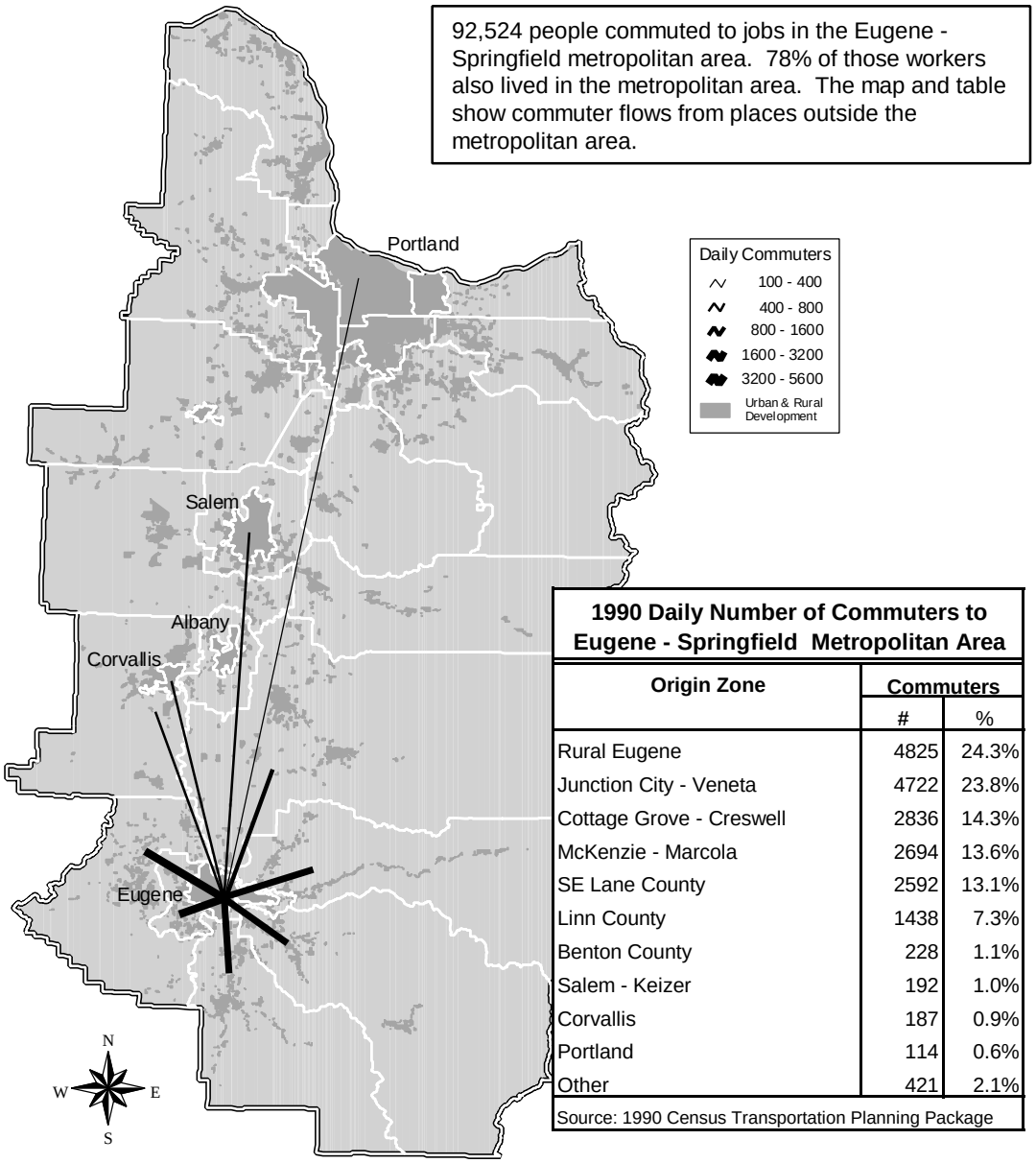
Origin Zone	Commuters	
	#	%
Benton County	4937	28.9%
Linn County	3362	19.7%
Rural Albany	2751	16.1%
Albany to Corvallis	2049	12.0%
Corvallis to Albany	985	5.8%
Salem - Keizer	825	4.8%
North Santiam	679	4.0%
Polk County	581	3.4%
Eugene - Springfield	297	1.7%
Other	588	3.4%

Source: 1990 Census Transportation Planning Package

Summary of Commutes to Eugene – Springfield in 1990

The Eugene – Springfield metropolitan area is the most insular of Willamette Valley job centers. 78% of commuters to the metropolitan area lived within the metropolitan area. Less than 3% of workers commuted from residences outside of Lane County. Almost a quarter of the commuters from outside of the metropolitan area lived in rural areas immediately surrounding the metropolitan area.

Figure 8
1990 Commutes to Eugene – Springfield



1990 Daily Number of Commuters to Eugene - Springfield Metropolitan Area

Origin Zone	Commuters	
	#	%
Rural Eugene	4825	24.3%
Junction City - Veneta	4722	23.8%
Cottage Grove - Creswell	2836	14.3%
McKenzie - Marcola	2694	13.6%
SE Lane County	2592	13.1%
Linn County	1438	7.3%
Benton County	228	1.1%
Salem - Keizer	192	1.0%
Corvallis	187	0.9%
Portland	114	0.6%
Other	421	2.1%

Source: 1990 Census Transportation Planning Package

DESCRIPTION OF COMMUTING PATTERNS

County Commuting Patterns

Figure 9 and *Table 2* show total 1990 commuter flows within and between the Willamette Valley's 10 counties. Several patterns are evident. First, the three counties that make up the Portland metropolitan area account for most of the valley's jobs (63%) and most of the valley's commuters (62%). Second, most commuters work in the county where they live. Of the 888,874 commuters who reside in Willamette Valley counties, 655,862 or 74% work in the county where they reside. Clackamas and Polk are the only counties that have more commuters leaving than staying. Both of these counties are parts of metropolitan areas where the major draw is the primary city in a neighboring county. By contrast, very few of the commuters living in Lane County (< 3%) leave the county for work.

Figure 9

1990 County Commute Patterns in the Willamette Valley

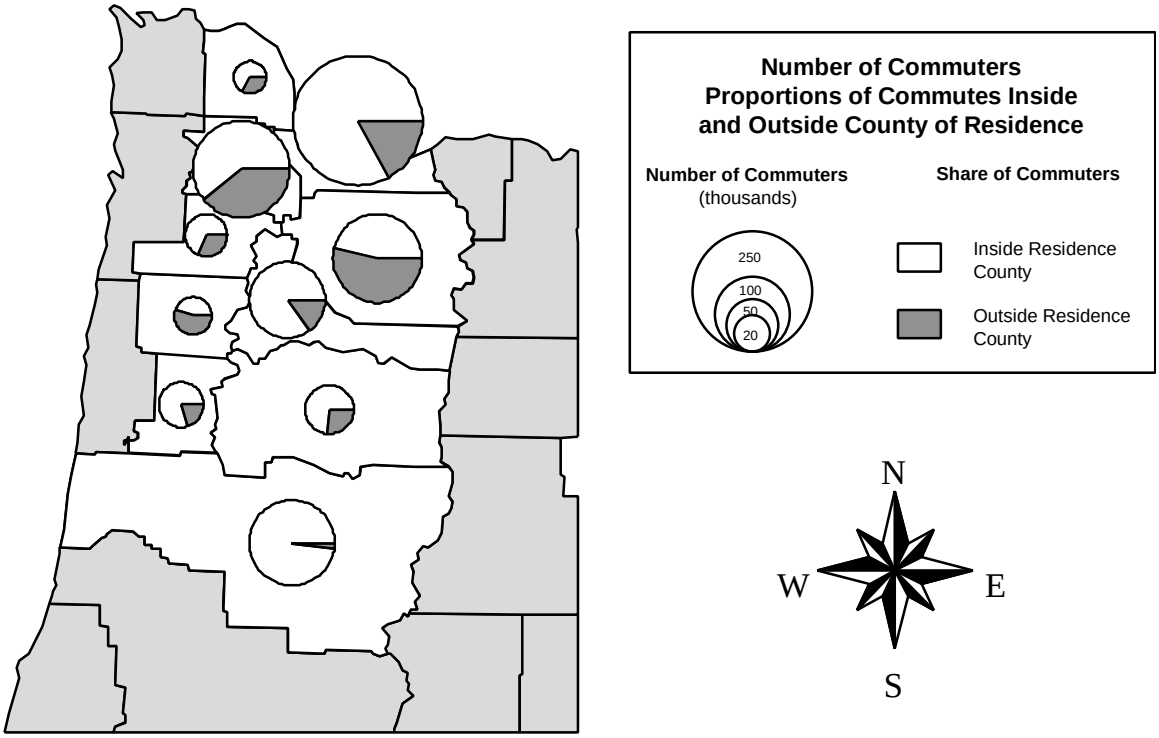


Table 2
1990 Willamette Valley County to County Commuting Flows

Residence	Workplace										
	Benton	Clackamas	Columbia	Lane	Linn	Marion	Multnomah	Polk	Washington	Yamhill	Residence Total
Benton	24,326	40	13	668	4,058	695	201	197	131	50	30,379
Clackamas	50	59,320	91	105	40	3,280	52,332	63	13,092	467	128,840
Columbia	0	182	8,853	5	0	30	3,162	2	1,017	24	13,275
Lane	549	85	13	116,269	1,148	348	385	21	99	8	118,925
Linn	4,406	39	0	1,579	26,468	3,266	220	117	61	25	36,181
Marion	434	3,097	49	328	2,364	79,900	2,835	2,141	2,141	889	94,451
Multnomah	47	21,548	639	137	68	1,103	222,025	53	22,966	346	268,932
Polk	510	124	20	56	359	7,894	425	8,648	209	1,120	19,365
Washington	75	7,868	749	108	28	1,051	49,201	25	92,200	941	152,246
Yamhill	71	742	27	14	16	1,149	1,998	476	3,934	17,853	26,280
Work Total	30,468	93,045	10,454	119,269	34,549	98,716	332,784	12,016	135,850	21,723	888,874

Source: 1990 Census Transportation Planning Package

Figures 10 and *11* illustrate the 1990 intercounty commuter flows.

Figure 10
Distribution of 1990 Inter-County Commuter Travel
By Residents of Northern Willamette Valley Counties

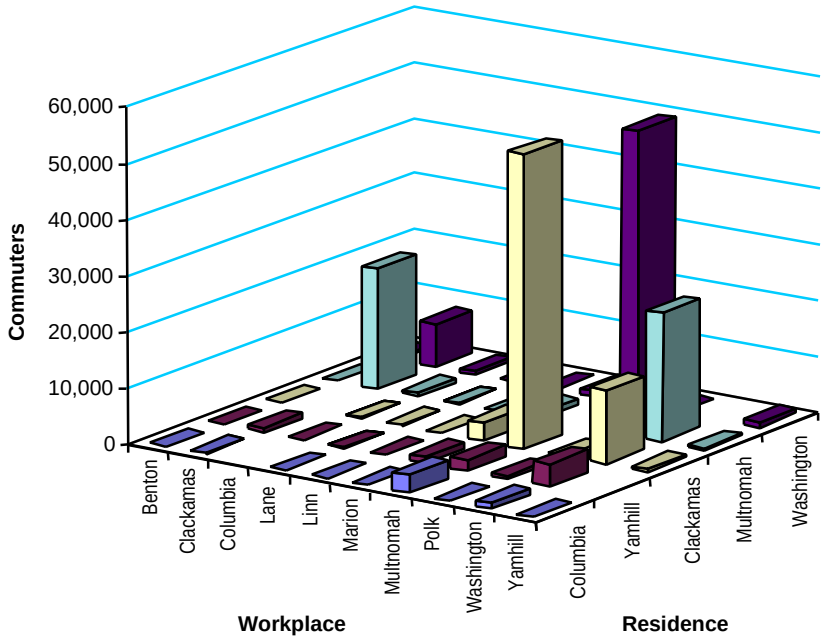
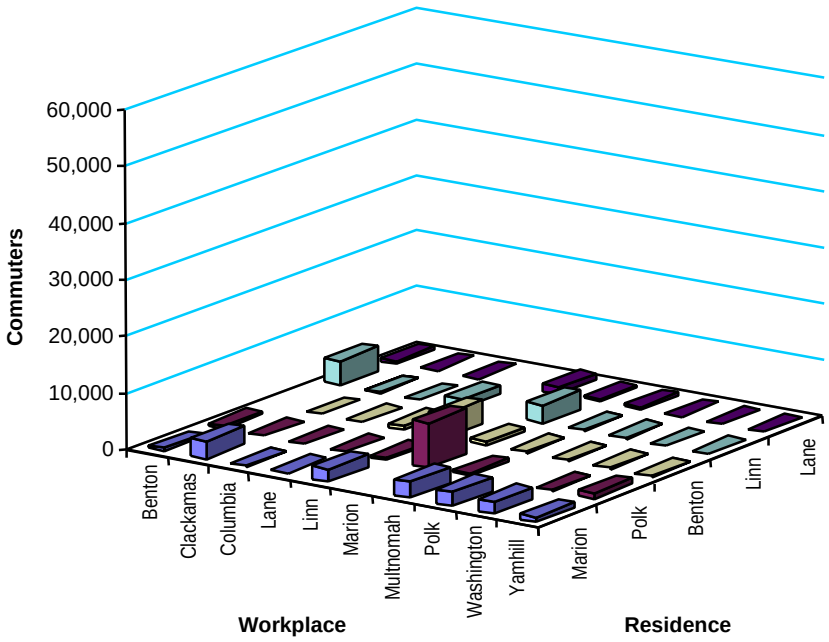


Figure 11
Distribution of 1990 Inter-County Commuter Travel
By Residents of Southern Willamette Valley Counties



The influence of the three Portland metropolitan counties can be seen in *Figure 10*. The majority of inter-county commuters travel between these three counties. Other flows between counties are very small in comparison. These three counties also attracted 32% (21,127) of the external commuters originating from other valley counties, mostly from Marion, Yamhill and Polk Counties.

Figure 11 shows several other commuting patterns. Marion County's central location in the Willamette Valley results in its more even distribution of commuters to other valley counties. The primary commuter flows to Marion County are attracted from Polk, Linn and Clackamas Counties. Another strong connection is between Linn and Benton Counties. Each is the other's strongest partner and the flows between them are about equal.

Commuting to Major Urban Areas

A major limitation of using county-level data is that it gives an inflated impression of the magnitude of long-distance commuting. For example, because the Portland and Salem metropolitan areas are split by county boundaries, much inter-county commuting in those areas involves relatively short trips. County-level commuting data is also too generalized to show the distribution of commuter travel patterns. These limitations can be overcome by analyzing data at a finer geographic scale. This was done using the CTPP minor civil

division and place dataset. The data were aggregated into 29 zones including 9 employment centers.

The results of the analysis are shown in *Table 3*. Commutes to the urban areas listed in this table account for about 80% of all commutes within the Willamette Valley.

The dominance of internal to internal commuting is also evident at this geographic scale of analysis. For the valley as a whole there were 708,742 commuters bound for one of the nine urban destinations of Portland, West Metro, Southeast Metro, Gresham, McMinnville, Salem/Keizer, Albany, Corvallis, or Eugene/Springfield in 1990. Of those, 413,397 (58.3%) were internal commuters. In absolute numbers the internal flows were greatest in Portland (169,243), Eugene/Springfield (72,275), West Metro (55,229), and Salem/Keizer (53,897).

Table 3
1990 Total Number of Willamette Valley Commuters by City

	Workplace									
Residence	Portland	West Metro	Southeast Metro	Gresham	McMinn-ville	Salem Keizer	Albany	Corvallis	Eugene Springfield	Residence Total
Portland (4)	**169,243**	16,781	12,425	5,808	128	649	29	23	114	205,200
West Metro (3)	41,542	**55,229**	6,236	520	130	599	7	46	59	104,368
SE Metro (10)	27,574	6,719	**23,347**	761	52	532	23	31	62	59,101
Gresham (5)	19,989	1,231	1,544	**9,983**	14	43	16	14	13	32,847
McMinnville (8)	199	331	64	-	**4,922**	201	-	15	8	5,740
Salem-Keizer (17)	1,433	767	565	41	284	**53,897**	535	290	192	58,004
Albany (22)	96	16	10	-	-	684	**8,500**	2,049	71	11,426
Corvallis (20)	100	68	19	16	29	340	985	**16,001**	187	17,745
Eugene-Springfield (26)	295	27	47	8	-	202	102	195	**72,275**	73,151
Columbia Co. (1)	2,971	462	134	25	6	16	-	-	5	3,619
Washington Co. (2)	7,862	13,899	1,086	137	83	129	-	29	21	23,246
Rural Portland (6)	7,245	964	615	1,463	-	41	-	-	10	10,338
NW Clackamas Co. (9)	11,200	2,980	7,539	713	11	337	5	-	8	22,793
SE Clackamas Co. (12)	4,638	669	4,274	543	5	118	-	8	15	10,270
Sandy (11)	3,195	295	664	1,687	-	39	-	-	-	5,880
Yamhill Co. (7)	1,898	2,567	580	19	3,050	803	12	46	12	8,987
Molalla - Silverton (14)	1,125	605	951	71	17	1,648	20	12	8	4,457
Woodburn (13)	802	812	1,006	16	9	841	21	-	6	3,513
North Santiam (18)	130	30	36	3	27	3,630	587	92	11	4,546
Rural Salem (16)	112	34	101	16	27	5,596	82	18	30	6,016
Polk Co. (15)	239	48	78	8	182	4,485	204	377	36	5,657
Rural Albany (21)	12	3	15	-	7	196	1,797	954	46	3,030
Linn County (23)	83	20	17	7	-	541	2,381	981	1,438	5,468
Benton Co. (19)	36	26	7	-	6	167	265	4,672	228	5,407
Junction City - Veneta (24)	39	-	8	-	-	23	30	50	4,722	4,872
Rural Eugene (25)	14	-	6	-	-	21	-	11	4,825	4,877
McKenzie - Marcola (27)	-	-	-	-	-	7	-	19	2,694	2,720
SE Lane County (28)	-	-	-	-	-	-	6	13	2,592	2,611
Cottage Grove - Creswell (29)	6	-	-	-	-	9	2	-	2,836	2,853
Workplace Total	302,078	104,583	61,374	21,845	8,989	75,794	15,609	25,946	92,524	708,742

Source: 1990 Census Transportation Planning Package

The internal commute was not the greatest volume commute for two areas. Approximately 70% of Gresham commuters and approximately 60% of Southeast Metro area commuters worked outside their areas of residence. At the other end of the

spectrum, approximately 7% of Salem-Keizer commuters, 10% of Corvallis commuters and 1% of Eugene-Springfield area commuters worked outside their residence areas.

The Portland metropolitan area job centers were clearly dominant, providing 69% (489,880) of all employment in these job centers. 81% of all the people who filled these jobs also lived within the Portland metropolitan area. Other commuter flows to the Portland metropolitan area were small in comparison. The larger of these were:

- Remainder of Washington Co.: 22,984 (4.7%)
- NW Clackamas Co.: 22,432 (4.6%)
- Rural Portland: 10,286 (2.1%)
- SE Clackamas Co.: 10,124 (2.1%)
- Sandy: 5,841 (1.2%)
- Yamhill Co.: 5,064 (1.0%)
- Columbia Co.: 3,592 (0.7%)
- Salem-Keizer: 2,806 (0.6%)
- Molalla – Silverton area: 2,752 (0.6%)
- Woodburn area: 2,636 (0.5%)

Noteworthy commuter flows to the other major job centers include the following:

- The heaviest commuter flows to the Salem-Keizer metropolitan area came from the Rural Salem area (5,596), Polk County (4,485), the North Santiam area (3,630) and the Molalla – Silverton area (1,648).
- The biggest flows to the Albany urban area came from the Linn County area (2,381), the Rural Albany area (1,797) and the Corvallis area (985).
- The Corvallis urban area was the destination for commuters primarily from Benton County (4,672), Albany (2,049), the Linn County area (981) and the Rural Albany area (954).
- The heaviest commuter flows to the Eugene-Springfield area came from the Rural Eugene area (4,825), the Junction City – Veneta area (4,722), the Cottage Grove – Creswell area (2,836), the McKenzie - Marcola area (2,694), the Southeast Lane County area (2,592) and the Linn County area (1,438).
- McMinnville attracted few commuters from outside of Yamhill County.

These patterns indicate that commuter flows up the I-5 and OR-99W corridors into the Portland metropolitan area from counties to the south were very small compared to flows within the Portland metropolitan area. Even when aggregating commuters from all places outside of Clackamas, Multnomah and Washington Counties that might have used Interstate 5 to reach metropolitan Portland, the amount was less than 2% of the metropolitan area's total commuters. That was about the same amount as the number of commuters that travel from Washington County to Portland (7,862) or rural Portland to Portland (7,245). Commuting in the I-5 corridor was also not the dominant pattern for the other major job centers. *Figures 6, 7 and 8* illustrate that the major commuter flows occur across the valley, not up and down the valley.

ASSESSMENT OF COMMUTING ON INTERSTATE-5

Intercity Commuting and Congestion

The information presented above suggests that long-distance commuting contributes relatively little to the total impact of commuting on the highway system. The vast majority of commuters in the Willamette Valley do not travel long distances to work. About 78% of all commuters in 1990 traveled to jobs located within the metropolitan or urban area where they lived. In 1996, less than 15% traveled more than 30 minutes to work. (*Table 4*) For example, although over a half million workers commuted to jobs in the Portland metropolitan area in 1990, less than 4% (19,280) came from areas outside of Clackamas, Multnomah and Washington Counties.

Table 4
Willamette Valley Commuting Times, 1990-1996

Commuting Time	Portland Metropolitan Counties		Other Willamette Valley Counties	
	1990	1996	1990	1996
0 – 10 minutes	32.6 %	34.1 %	49.8 %	46.3 %
11 – 20 minutes	34.0 %	30.0 %	28.6 %	31.3 %
21 – 30 minutes	18.5 %	21.3 %	11.4 %	9.8 %
31 – 45 minutes	11.9 %	8.9 %	5.7 %	6.4 %
46 – 60 minutes	2.6 %	3.9 %	1.0 %	4.5 %
> 60 minutes	0.4 %	1.9 %	3.5 %	1.7 %
Mean (minutes)	19.6	20.3	17.0	17.4

Source: 1990 & 1996 Oregon Population Surveys

More insight into the effects of intercity commuting on congestion comes from the comparison of 1996 estimates of intercity commuting traffic volumes on I-5 with total traffic volumes and highway capacity.[6] The appendix to this report describes the methodology used for developing the estimates and includes the data tables from which the following set of graphs was derived.

Figure 12 and *Figure 13* show estimates of daily northbound and southbound commuter traffic flows to work.

[6] Travel of commuters who live and work within each of the job centers was not estimated because that could not realistically be done using the CTPP data.

Figure 12

Estimated 1996 Daily Intercity Commuting Traffic Heading to Work in the Northbound Direction on Interstate 5

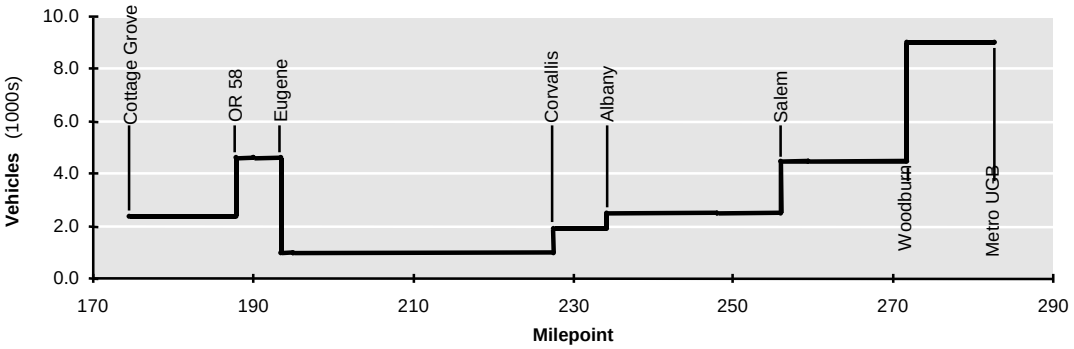
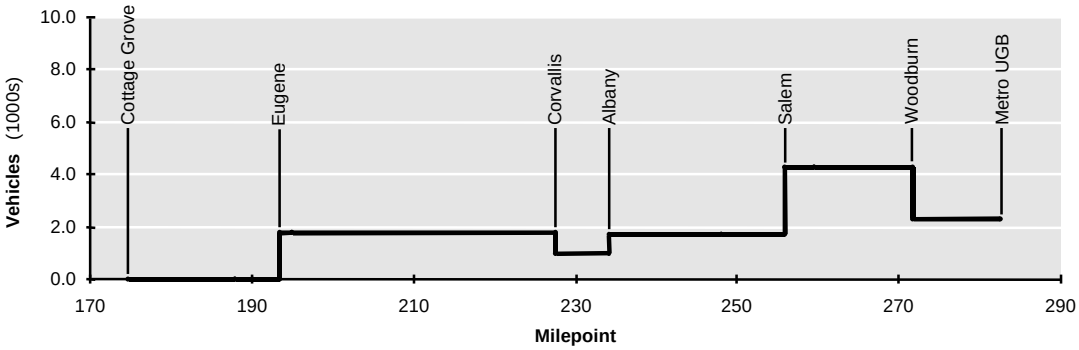


Figure 13

Estimated 1996 Daily Intercity Commuting Traffic Heading to Work in the Southbound Direction on Interstate 5



It can be seen from these figures that the attraction of the Portland metropolitan area for employment is very evident. Three times more commute traffic was destined for the area than left the area. The Salem-Keizer area was also a strong draw. Between Woodburn and Salem, more traffic headed southward into Salem than northward out of Salem. The Eugene – Springfield attracts commuters mostly from the south.

Figure 14 compares estimated daily intercity commuting traffic volumes on I-5 to average daily traffic volumes (ADT) in 1996. For most of the length of I-5 in the valley, intercity commuting traffic volumes comprised about 15% to 20% of ADT. Between Salem and Portland, intercity commuter traffic comprised about 25% to 33% of ADT.

Figure 14

Ratio of Estimated 1996 Total Daily Intercity Commuting Traffic to Average Daily Traffic on Interstate 5

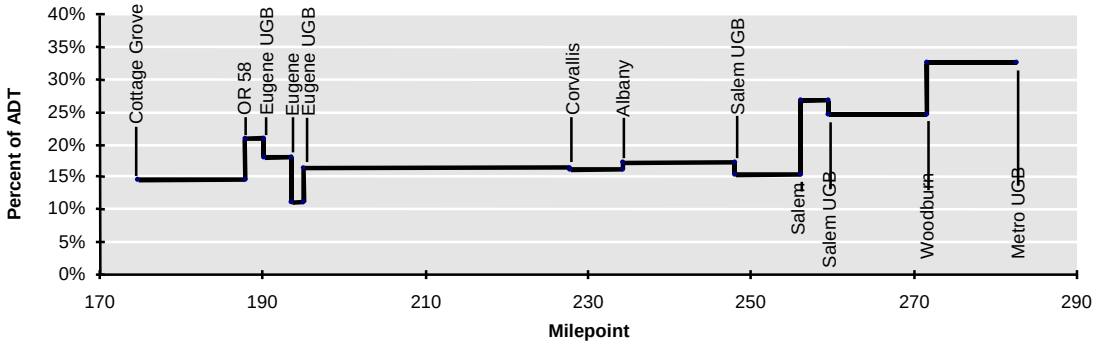


Figure 15 shows the highest peak intercity traffic flows on I-5. The highest flows occurred between the Salem and the Portland metropolitan areas. Relatively high peak intercity traffic flows are also present between the junction of OR-58 and the Eugene-Springfield area. Elsewhere, intercity commuter traffic volumes were relatively low.

Figure 15

Estimated 1996 Peak Hour Intercity Commuting Traffic on Interstate 5

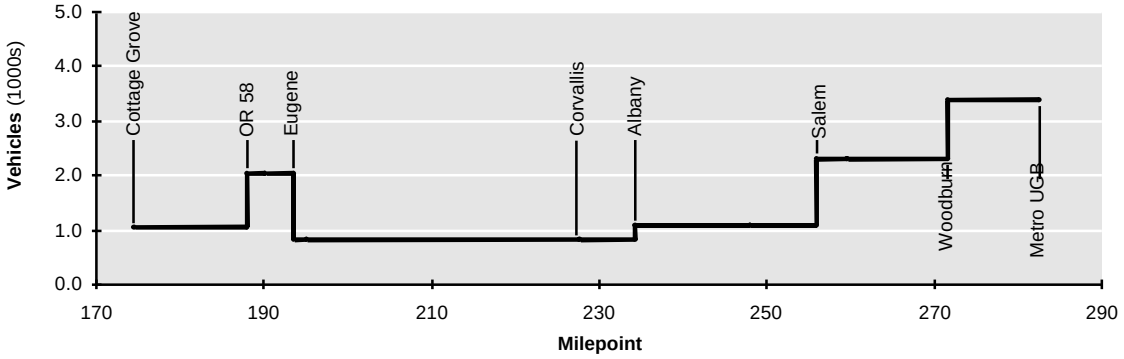
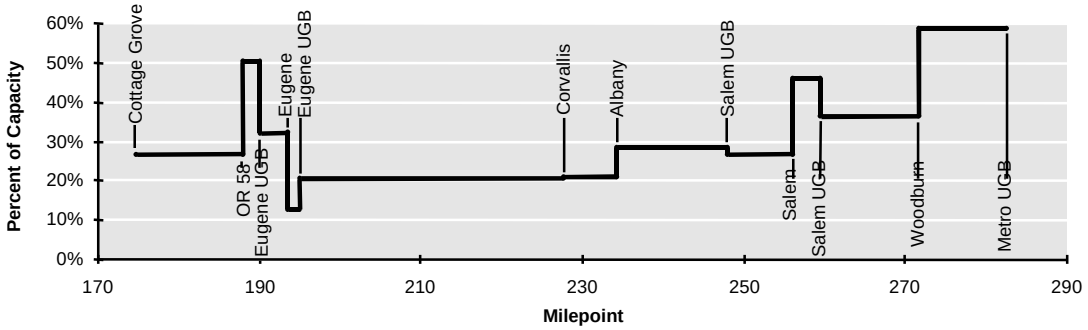


Figure 16 compares peak intercity traffic flows to the capacity of I-5. Commuter traffic used between 20% and 30% of the capacity of the freeway for most of its length in the Willamette Valley. Almost 60% of the freeway's capacity north of Woodburn was used by peak hour intercity commuters. Less than 40% of the capacity was used between Salem and Woodburn except within the Salem UGB where a travel lane is being added in each direction. About half of the peak hour capacity was used to the south of the Eugene-Springfield area between OR-58 and the urban area.

Figure 16
Comparison of Estimated 1996 Peak Hour Intercity Commuting Traffic to Capacity of Interstate 5



Markets for Commuter Services and Congestion Reduction

Estimates of the potential market for commuter ridesharing and other transportation services can also be derived from the adjusted Census information. The following analysis estimates this potential market and the effects that capturing it might have on freeway congestion. Peak period urban area travel data were used in the analysis rather than the county level data because successful commuter transportation services depend on having concentrations of trip destinations. The starting point of the analysis was the 1990 Census data on the percentage of commuters who travel alone. This is shown in *Table 5*. During peak hours, about 77% of all Willamette Valley commuters drove alone in 1990. The cities of Portland and Corvallis had lower drive-alone percentages.

Rough and very optimistic estimates of the potential market for commuter transportation services can be computed by applying the average drive-alone rate of commuters living and working in the City of Portland to all 1996 estimated Willamette Valley peak period commuter flows. The result, shown in *Table 6,* is the reduction in the number of drive alone commuters during the peak period. The potential market for commuter services, defined in this way, is sizable. If the drive-alone share of commuters dropped to 65%, the total reduction in peak period commuters would be 56,410. This would be about 12 percent of the total peak commuters to the major urban areas.

Table 5
Percent of 1990 Willamette Valley Commuters Who Drove Alone During the Peak Period
(* indicates cells with fewer than 20 commuters)

Residence	Workplace									Residence Total
	Portland	West Metro	Southeast Metro	Gresham	McMinn-ville	Salem Keizer	Albany	Corvallis	Eugene Springfield	
Portland (4)	**65%**	82%	84%	79%	92%	64%	*	*	81%	68%
West Metro (3)	74%	**86%**	90%	70%	91%	76%	*	*	100%	81%
SE Metro (10)	80%	90%	**85%**	93%	72%	83%	*	100%	71%	83%
Gresham (5)	76%	84%	90%	**81%**	*	20%	*	*	*	78%
McMinnville (8)	93%	76%	100%	*	**83%**	100%	*	*	*	84%
Salem-Keizer (17)	77%	77%	73%	*	89%	**77%**	82%	82%	72%	77%
Albany (22)	57%	*	*	*	*	90%	**83%**	86%	80%	84%
Corvallis (20)	100%	75%	*	*	100%	78%	88%	**69%**	80%	71%
Eugene-Springfield (26)	72%	*	*	*	*	86%	100%	76%	**79%**	79%
Columbia Co. (1)	74%	86%	83%	*	*	*	*	*	*	77%
Washington Co. (2)	77%	83%	80%	64%	85%	75%	*	*	*	81%
Rural Portland (6)	78%	83%	92%	92%	*	78%	*	*	*	81%
NW Clackamas Co. (9)	79%	90%	90%	94%	*	72%	*	*	*	84%
SE Clackamas Co. (12)	79%	72%	86%	93%	*	81%	*	*	*	82%
Sandy (11)	80%	78%	91%	90%	*	100%	*	*	*	84%
Yamhill Co. (7)	74%	83%	87%	*	83%	76%	*	62%	*	81%
Molalla - Silverton (14)	76%	70%	88%	*	*	85%	*	*	*	81%
Woodburn (13)	92%	82%	74%	*	*	81%	*	*	*	81%
North Santiam (18)	91%	*	100%	*	*	78%	94%	92%	*	81%
Rural Salem (16)	100%	*	100%	*	*	86%	81%	*	*	87%
Polk Co. (15)	76%	100%	100%	*	93%	83%	94%	54%	100%	82%
Rural Albany (21)	*	*	*	*	*	94%	86%	88%	*	87%
Linn County (23)	*	*	*	*	*	72%	88%	75%	83%	83%
Benton Co. (19)	*	*	*	*	*	100%	88%	82%	86%	82%
Junction City - Veneta (24)	*	*	*	*	*	*	100%	100%	83%	84%
Rural Eugene (25)	*	*	*	*	*	*	*	*	83%	83%
McKenzie - Marcola (27)	*	*	*	*	*	*	*	*	84%	84%
SE Lane County (28)	*	*	*	*	*	*	*	*	88%	88%
Cottage Grove - Creswell (29)	*	*	*	*	*	*	*	*	79%	80%
Workplace Total	70%	85%	86%	83%	84%	79%	85%	74%	80%	77%

Source: 1990 Census Transportation Planning Package

As might be expected, most of the potential for reduction exists within the urban areas, particularly in the Portland metropolitan area. Almost half of the reduction (26,741) would be of commuters who reside and work in the Portland metropolitan area. Another 21% of the reduction (12,019) would involve commuters who reside and work in the other urban areas. Of the remaining reductions, about 15% of the total (8,416) would be of commuters who work in the Portland, West Metro, Southeast Metro or Gresham areas and live outside of those areas in Clackamas, Multnomah or Washington Counties. About 9% of the total potential reductions (5,003) would involve commuters who travel to work in other areas within the counties where they reside. Only 7% of the potential commuter reductions (4,231) would be of commuters who travel to an urban area in a different county.

Figure 17 shows how the potential reductions in interurban and rural to urban commuters might affect the capacity of Interstate 5 during the peak hour.[7]

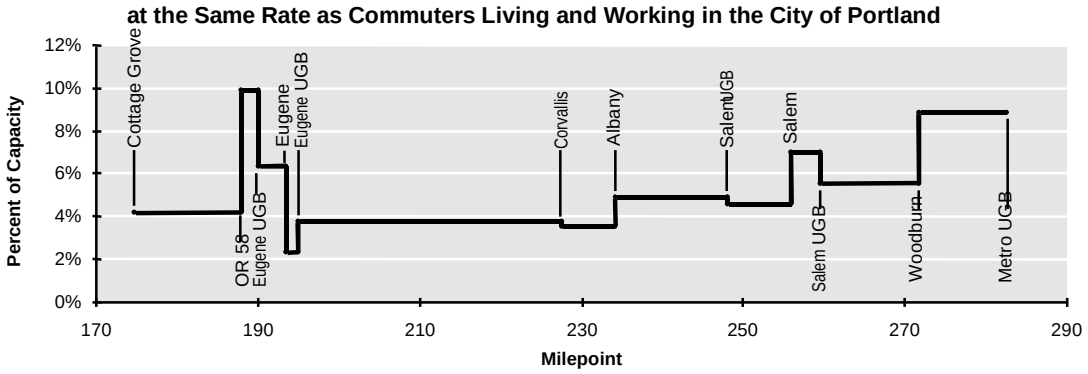
[7] It was also assumed that that for each commuter who stops driving alone there would be one less vehicle on the highway.

Table 6
1996 Hypothetical Peak Period SOV Reduction by City

Residence	Workplace									Residence Total
	Portland	West Metro	Southeast Metro	Gresham	McMinn-ville	Salem Keizer	Albany	Corvallis	Eugene Springfield	
Portland (4)	-	1,811	1,325	496	22	(2)	3	3	10	3,668
West Metro (3)	2,987	**8,435**	1,129	20	23	53	-	7	11	12,665
SE Metro (10)	3,212	1,430	**3,002**	163	3	71	3	11	1	7,897
Gresham (5)	1,358	149	217	**1,007**	4	(11)	4	3	2	2,734
McMinnville (8)	25	18	11	-	**567**	48	-	(12)	-	657
Salem-Keizer (17)	108	63	31	8	43	**4,410**	77	47	7	4,793
Albany (22)	(4)	-	-	-	-	85	**945**	302	6	1,334
Corvallis (20)	26	3	2	-	11	27	157	**360**	13	598
Eugene-Springfield (26)	15	5	1	4	-	26	33	19	**5,737**	5,840
Columbia Co. (1)	232	122	26	(8)	-	9	-	-	3	383
Washington Co. (2)	632	1,915	94	(0)	14	11	-	(5)	3	2,663
Rural Portland (6)	524	123	85	248	-	4	-	-	(2)	982
NW Clackamas Co. (9)	1,290	579	1,225	179	-	15	-	-	-	3,288
SE Clackamas Co. (12)	319	33	469	94	-	11	-	-	3	928
Sandy (11)	242	19	82	264	-	8	-	-	-	616
Yamhill Co. (7)	97	282	73	1	379	60	5	(1)	(6)	891
Molalla - Silverton (14)	65	18	102	(0)	7	195	6	2	(4)	390
Woodburn (13)	89	74	41	(4)	4	77	4	-	1	286
North Santiam (18)	11	8	10	-	6	300	114	21	1	471
Rural Salem (16)	14	7	12	1	3	912	11	8	8	977
Polk Co. (15)	11	13	14	4	29	545	37	(35)	10	628
Rural Albany (21)	(3)	1	1	-	3	22	259	165	5	453
Linn County (23)	4	5	4	-	-	21	345	77	149	605
Benton Co. (19)	(4)	(0)	-	-	(4)	30	50	519	18	610
Junction City - Veneta (24)	(5)	-	-	-	-	3	15	15	552	580
Rural Eugene (25)	(4)	-	-	-	-	2	-	6	573	577
McKenzie - Marcola (27)	-	-	-	-	-	-	-	4	308	312
SE Lane County (28)	-	-	-	-	-	-	-	-	348	348
Cottage Grove - Creswell (29)	-	-	-	-	-	4	-	-	236	239
Workplace Total	11,239	15,113	7,954	2,477	1,112	6,938	2,070	1,515	7,992	56,410

Source: 1990 Census Transportation Planning Package as adjusted according to methods described in the appendix.

Figure 17
Estimated 1996 Capacity Savings on I-5 if All Intercity Commuters Drove Alone at the Same Rate as Commuters Living and Working in the City of Portland



For most of the length of I-5 between Cottage Grove and Wilsonville, the hypothesized reductions in interurban and rural to urban commuters would only equate to from 4% to 6% of the capacity of the I-5. South of Eugene, the potential reductions would be equal to about 10% of the freeway capacity. To the north of Woodburn, the reductions would

equate to about 9% of the freeway's capacity. To put the magnitudes in perspective, consider that from 1995 to 1996, traffic volumes on I-5 grew by 4.7% between Wilsonville and Woodburn.

This analysis indicates that the greatest needs and benefits for commuters services are within the major urban job centers. Almost half of the potential commuter reductions would be of people who live and work in the Portland metropolitan area job centers and almost a quarter of the reductions would be of people who live and work in the other job centers. These needs might best be met through expansion of urban public transportation systems in combination with rideshare programs and other supporting services such as employer commute coordinators, "guaranteed ride home", flexible work hours, and telecommuting options.

The Portland metropolitan area currently provides the highest level of commuter services with the highest level of public transit service and a employee commute options (ECO) program. The Eugene – Springfield metropolitan area provides the next best level of transit service. The Lane Transit district is currently planning the deployment of a bus rapid transit system that would significantly improve service to commuters. The Salem – Keizer metropolitan area also has a transit system that provides higher levels of transit service during the morning and evening commute peaks. Rideshare programs are in place in both the Eugene – Springfield and Salem – Keizer metropolitan areas but ECO programs are not in place there. The Albany/Corvallis area has very limited public transportation services that are not oriented to commuters. A new TDM/rideshare program is being initiated in this area. The McMinnville area has no public transportation services for commuters and no organized rideshare program.

The next greatest needs and benefits for commuter services are to serve commute travel to the major job centers from smaller cities within the counties where the job centers are located. About 15% of the potential reductions would be of people who live in Clackamas, Multnomah and Washington Counties and work in Portland metropolitan area job centers. About 9% would be people who to live outside one of the other job centers but commute to the job center located in the county where they reside. Services to these commuters are relatively weak. Tri-Met and Lane County Transit offer transit service to many outlying communities. The City of Wilsonville provides commuter transportation from Wilsonville to Portland and to Salem. No public transit services are provided which commuters can use in Polk, Marion, Linn or Benton Counties to travel to the nearby job centers. Rideshare information is available for all of the metropolitan area counties except for Linn and Benton Counties where such a program is being initiated.

The need for commuter services are weakest for the longer distance commuters who travel to a job center located outside of their residence counties. These commuters would only account for about 7% of the potential reductions. The travel patterns of these commuters are the least aggregated and their travel contributes the least to highway congestion. The longer distances these commuters travel also creates a natural incentive to carpool. This shows up as relatively low SOV use for the larger of the longer distance

commutes where there is a potential to aggregate trips. A comparison of commuting to Salem provides an apt example. 74% of the 3,622 workers who commuted from the Portland metropolitan area to Salem traveled by SOV in 1990. In comparison, 83% of the 10,062 workers who commuted from outside of Salem but inside of Polk and Marion Counties traveled by SOV in 1990. Long-distance commuters are not only more willing to carpool and vanpool, they are also more willing to pay full fares for commuter bus services. Presently commuter bus services run between Portland and Salem and between Eugene and Salem.

COMMUTING AND GROWTH MANAGEMENT

Commuting patterns are related to mobility and the distribution of jobs and housing. Increases in mobility over time have given Oregonians more choices about where they live and work. As they have exercised these choices, average commute distances have increased and the distribution of jobs and housing has become more dispersed. While mobility is a key factor affecting commuting, it is not the only one. Other factors such as zoning and the provision of public services like sewer and water affect the distribution of jobs and housing and commuting patterns as well. Thus transportation and growth management are tied together at a basic level. This section looks at two aspects of the connections between transportation and growth management in the Willamette Valley: how travel time affects the dispersion of housing and commuting and how the balance of jobs and housing affects intercity commuting.

Commuting and Accessibility to Jobs

Travel time is a very important factor influencing intercity commuting. The proportion of people willing to commute decreases as travel time increases. This is shown in *Table 4*. Over 85% of Willamette Valley workers in 1990 and 1996 had commutes that were 30 minutes or less. The toleration of longer commutes has increased a small amount since 1990.

The relationship between travel time and commuting is also illustrated in *Figures 18, 19*, and *20*. These figures show the average commute time[8] to Portland, Eugene or Salem from each Willamette Valley city and the proportion of the employed population of each city that commutes to Portland, Eugene or Salem. The figures also show a trend-line which best fits the data.[9]

Several patterns can be seen from these figures.

- Commuting drops off rapidly with increasing travel time. For example, while a city located 20 minutes away from Portland could be expected to send about 60% of its labor force to Portland, a city located 40 minutes away would send less than 20% of its workers there.
- The relationships between travel time and commuting for Portland and Eugene are similar for travel times less than 50 minutes. Portland has greater attractiveness for travel times greater than 50 minutes.
- Salem appears to be a much less attractive as a job center than Portland or Eugene. For example, a community that is a 30 minute drive from Salem and the same distance from Portland or Eugene might be expected to send about 15% of its workforce to Salem and about 30% to Portland or Eugene. Population size might be a factor since

[8] The measure used was average travel time by single occupancy automobile. This is the best measure of distance because it addresses congestion but does not include delay that is due to out of direction travel or waiting for other travelers.

[9] All of the best-fit curves are 4th order polynomials.

Portland and Eugene are larger job centers. The proximity of Salem to Portland and the strength of the Portland job market may be other factors.

Figure 18
Attractiveness of Portland to Commuters From Other Willamette Valley Cities

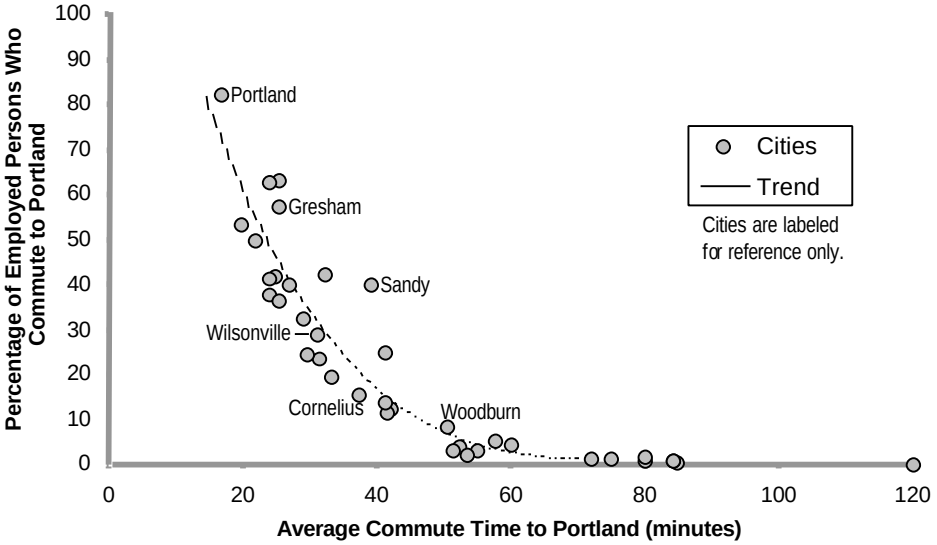


Figure 19
Attractiveness of Eugene to Commuters From Other Willamette Valley Cities

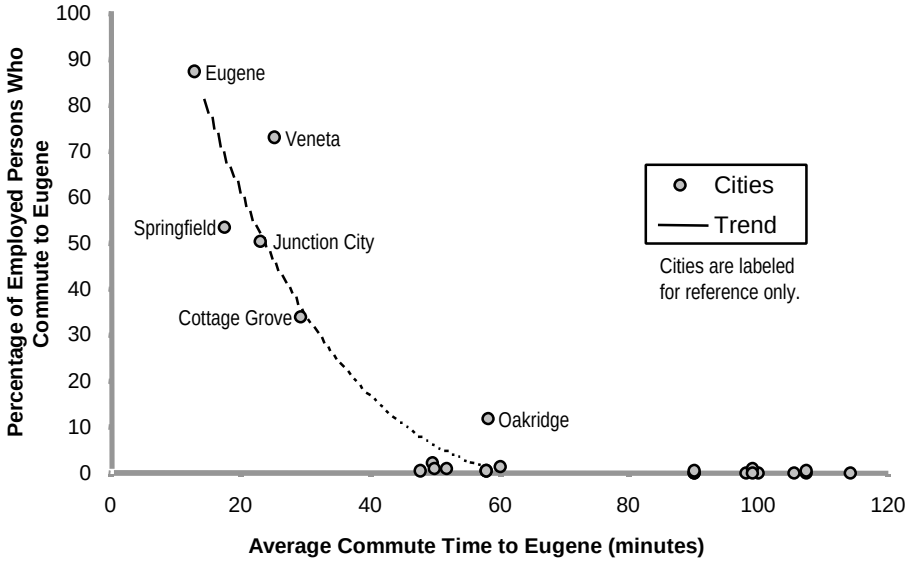
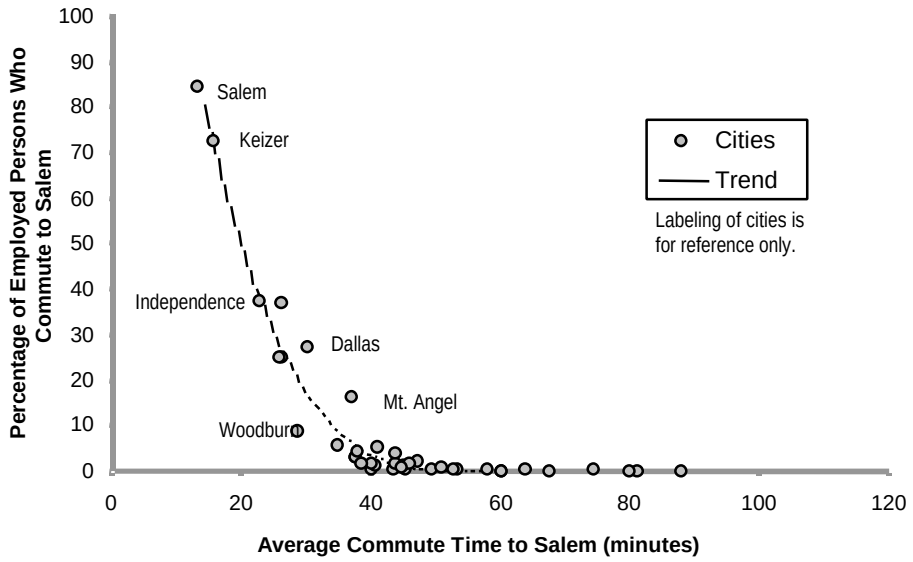


Figure 20
Attractiveness of Salem to Commuters From Other Willamette Valley Cities



It can be seen from the preceding figures that intercity commuting is strongly correlated with accessibility to major job centers. Where there is a high degree of accessibility to these job centers, there is typically a large amount of intercity commuting. The city of Keizer, for example, is very accessible to a large number of jobs in Salem and 73% of Keizer workers have jobs in Salem.

Commuting and Jobs-Housing Balance

Some land use and transportation planners hypothesize that intercity commuting is also caused by imbalances between jobs and housing within communities.[10] According to this hypothesis, the lack of available jobs or housing within a community causes people to live in different communities than where they work. Commuting between Albany and Corvallis is often cited as an example where high housing costs in Corvallis are hypothesized to cause some people to work in Corvallis but live in Albany.

Whether or not the balance of jobs and housing affects commuting in the Willamette Valley warrants scrutiny. Studies from other places are inconclusive and have limited applicability to Oregon. Supporters of the hypothesis point to studies on the effects of exclusionary city zoning on jobs-housing balance and intercity commuting. In Oregon, state land use planning laws prohibit cities from enacting exclusionary zoning laws and require adequate land be planned and zoned within each urban growth boundary to

[10] A good overview of research related to the jobs-housing balance hypothesis and debate about it's validity is contained in the following article by Jonathan Levine. "Rethinking Accessibility and Jobs-Housing Balance". APA Journal, Spring 1998, pp. 133-149.

accommodate all types of housing. However, some cities like Corvallis have enacted city charter provisions that require voter approval of all annexations. Such provisions may have the same effect as zoning which limits the supply of housing.

Despite the important regulatory differences between Oregon and other states, managing the balance of jobs and housing is often recommended as a strategy for reducing intercity commuting in Oregon. It is therefore important to evaluate the validity of the jobs-housing balance hypothesis using Oregon data. If the hypothesis is valid, then commuting might be reduced through government actions that alter the distribution of jobs and housing. If the hypothesis is not valid then actions to bring jobs and housing into better balance might turn out to be ineffective or counterproductive.

Data on Willamette Valley cities reported on by the Census were used to test the jobs-housing balance hypothesis. Data on jobs, workers and intercity commute times were extracted from the CTPP to develop measures for each city of jobs-housing balance, commuting and employment independence. The ratio of jobs located in a city to the number of employed city residents was used as the measure of jobs-housing balance. This measure was used rather than the ratio of jobs to housing because it better reflects the quantities that get balanced (jobs are filled by workers not households) and it is less affected by other social and economic characteristics of cities (e.g. average number of workers per household, the employment rate, the population age distribution). The percentage of employed city residents who work at jobs within the city was used as the measure of commuting.

The hypothesis was tested by examining a scatterplot which locates each city by the ratio of jobs to employed residents (on the horizontal axis) and the percentage of employed residents who work at jobs located in the city. This is shown in *Figure 21*. If the jobs-housing balance hypothesis is valid, then the percentage of employed residents who work at jobs in the city (internal commuting) should increase as the ratio of jobs to employed residents increases. However, the presence of such a relationship is not sufficient proof that a mismatch of jobs and housing caused commuting to occur. It is also possible that a mismatch of jobs and housing was a result of the willingness of workers to trade-off the time spent commuting for other location attributes such as space, school quality, public safety and aesthetics.[11] As *Figures 18, 19* and *20* illustrate, intercity commuting is strongly related to proximity to major employment centers. To capture this effect, a measure of "employment independence" was devised which compared the number of jobs located inside a city to the number of jobs located outside the city but within a 30 minute commute time. For example, McMinnville with an internal-external jobs ratio of 1.45 (6,028 / 4,151) was a much more independent employment center than Oregon City with an internal-external jobs ratio of 0.02 (6,113 / 336,837). Employment independence for each city is indicated in *Figure 21* by the pattern of each city's marker.

[11] Several studies have shown that average commute times are substantially higher than would be the case if the primary household location criteria was minimizing travel time to work. Genevieve Giuliano. 1995. "The Weakening Transportation-Land Use Connection". Access 6:3-11.

Figure 21

Comparison of Commuting and Accessibility to Jobs for Willamette Valley Cities

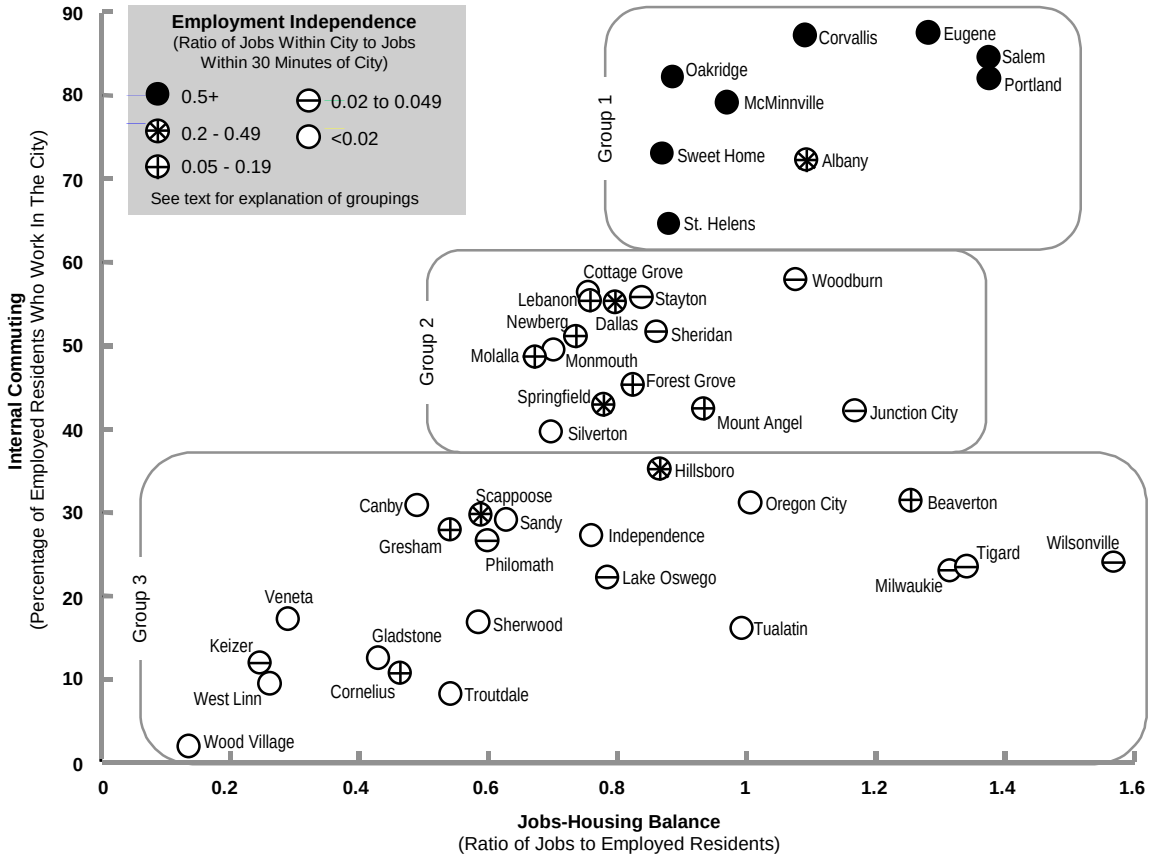


Figure 21 shows that the cities fall into three groupings based on their relationships to the major job centers of the Willamette Valley. Group 1 includes the primary job centers in the various regions of the Willamette Valley (Portland, Salem, Eugene, Corvallis, Albany, McMinnville) and cities that are most remote from these job centers (Oakridge, Sweet Home, St. Helens). Group 3 includes cities that are located within or near the major job centers. Most of the Group 3 cities are located within the Portland metropolitan area urban growth boundary. Group 2 includes cities that are neither near nor far from the major job centers (except for Springfield[12]).

Figure 21 shows that employment centers and the cities most isolated from them had the highest proportions of internal commuting. The cities that were most accessible to the major employment centers had the lowest proportions of internal commuting. Cities

[12] Springfield may be in this group because of its relative strength as a job center in the Eugene-Springfield metropolitan area. The number of jobs in Springfield was about 23% of the number of jobs in Eugene.

located farther from the major centers, but not isolated from the major centers, had intercity commuting levels between those of Group 1 and Group 3.

Overall jobs-housing balance appears to be a less significant factor than proximity to employment centers in its relationship to intercity commuting. *Figure 21* shows wide variations in internal commuting among cities that have the similar ratios of jobs to employed residents. For example, although Beaverton, Milwaukie, Tigard and Wilsonville have ratios of jobs to employed residents similar to those of Eugene, Salem and Portland, they have less than half the percentage of internal commuting. These cities also have much lower percentages of internal commuting than the cities in Group 2, all of which have much lower ratios of jobs to employed residents. Because of the significant differences between the groups, the potential connection between jobs-housing balance and intercity commuting should be examined within groups, not between them.

Group 1 cities all had high internal commuting ratios (>65%), high ratios of jobs to employed persons (>87%), and high ratios of internal to external jobs. Among these cities, their ratios of jobs to employed persons appear to be related to their sizes. The largest job centers (Eugene, Portland, Salem) have the highest ratios. The next largest job centers (Corvallis and Albany) have the next largest ratios. McMinnville has fewer jobs and yet a lower ratio, and the three cities that are not major job centers have the lowest ratios.

Within Group 1 there does not appear to be any significant relationship between intercity commuting and jobs-housing balance. Intercity commuting appears to be most related to the strength and independence of job centers. Portland, Salem, Eugene, Corvallis, McMinnville and Oakridge are the strongest and/or most independent job centers in the group and they have the highest percentages of internal commuting. Although Albany is a stronger job center than McMinnville, it is a much less independent employment center because it is located close to Corvallis, which is a much stronger job center. Although Oakridge is not a strong job center, it is most isolated from other job centers and so is a very independent employment center.

Group 2 cities other than Woodburn and Junction City, are very similar to one another with respect to jobs-housing balance and internal commuting. Their ratios of jobs to employed workers vary from a low of 0.67 for Molalla to a high of 0.93 for Mt. Angel. Woodburn and Junction City are the exceptions with ratios of 1.08 and 1.17 respectively. The percentages of internal commuting for these cities vary from a low of 40% for Silverton to a high of 58% for Woodburn.

There does not appear to be a significant relationship between internal commuting and jobs-housing balance among Group 2 cities. Variations in internal commuting among these cities appear to be unrelated to variations in their ratios of jobs to employed residents. Woodburn and Junction City, provide a good illustration of the missing relationship. These cities have significantly higher ratios of jobs to employed residents but

one of them is near the bottom of the range of internal commuting (Junction City) while the other is at the top (Woodburn).

Group 3 cities have the lowest proportions of internal commuting and the widest variation in jobs-housing balance. Internal commuting varies from a low of 2% for Wood Village to a high of 35% for Hillsboro. The ratios of jobs to employed residents range from a low of 0.14 for Wood Village to a high of 1.57 for Wilsonville.

There appears to be a weak relationship between jobs-housing balance and internal commuting among the Group 3 cities. The minimum percentage of internal commuting increases with increasing ratios of jobs to employed residents. The maximum percentage of internal commuting also appears to increase with increasing ratios of jobs to employed residents at the lower end of the scale. However, between these minimums and maximums there are wide variations in the ratios of jobs employed residents which are not accompanied by variations in internal commuting. The cities of Lake Oswego, Milwaukie, Tigard and Wilsonville provide an illustration of this lack of correspondence in variation. These cities, which have similar measures of employment independence, have ratios of jobs to employed residents that vary from 0.78 (Lake Oswego) to 1.57 (Wilsonville), but are hardly different with respect to their percentages of internal commuting.

In summary, the major employment centers and the cities most isolated from had the highest percentages of internal commuting. The cities that are located nearest the major job centers had the lowest rates of internal commuting (35% or below). Overall jobs-housing balance appears to be unrelated to intercity commuting except among cities that are located near to major job centers. Even for these cities the relationship appears to be weak. The balance of jobs and housing in a city appears to be associated with minimum and maximum percentages of internal commuting, but wide variations are accompanied by little variation in internal commuting.

CONCLUSIONS

The results of this research demonstrate the strength of the relationship between commuting and accessibility to employment. This relationship may seem obvious, but it is often overlooked or underestimated in discussions about commuting behavior. Most jobs are located in a few major urban job centers and most people are unwilling to commute long distances. Therefore intercity commuting is greatest in the vicinity of the major job centers. Cities that are nearest the major job centers are attractive places to live and the majority of their residents will commute to external job locations, even in cities that have more jobs than employed residents. The following findings support this overall theme.

Most people are unwilling to make long commutes. Less than 15% of Willamette Valley workers have commutes that are longer than 30 minutes.

Most commuters work in the county where they live and most inter-county commuting takes place in the Portland metropolitan area. Nearly three quarters of commuters work in the county where they reside. Over 70% of the commuters who live and work in different counties live and work in Clackamas, Multnomah or Washington Counties.

Most jobs and most of the commuting take place in the Portland metropolitan area. 63% of all jobs in the Willamette Valley are in Clackamas, Multnomah and Washington Counties and 62% of commuters live in these counties.

Long distance intercity commuters contribute relatively little to congestion in the Portland metropolitan area. Commuter flows from outside of the Portland metropolitan area are very small compared to flows between portions of the Portland metropolitan area. For example, the sum of all commuters who might use I-5 to commute to Portland from counties outside of the Portland metropolitan area is about the same number as the number of commuters traveling from parts of Multnomah County outside the Portland metropolitan area.

I-5 is not the dominant corridor for intercity commuting. The predominant commuting flows are across the valley to major employment centers, not up and down the valley between employment centers. The magnitude and direction of intercity flows indicates that higher flows occur in directions served by corridors other than I-5. For example, more people commuted into Portland from the east (27,000) and west (49,000) than commuted in from the south on I-5 (16,000) in 1990. The same commuting pattern is present around the Salem – Keizer metropolitan area and the Albany and Corvallis urban areas.

Portland is the dominant destination for commuters using I-5. Commuter flows into Portland are much higher than commuter flows into the other major job center.

The greatest needs for actions to provide commuter services and to reduce the number of single occupancy commuters are present within and near the urban job centers. The need for providing services to long-distance commuters is small in comparison. Reducing the valley-wide drive-alone rate to the low level found in the city of Portland (65%) might reduce the total number of peak hour vehicles in the Willamette Valley by 56,000. Most of the potential for reduction would be among commuters who commute to destinations within the metropolitan area, city, or county where they live.

- 69% of the people removed from the roadway system would be workers who commute within the major urban job centers.
- 15% would be workers who commute to the Portland metropolitan area from elsewhere in Multnomah, Clackamas and Washington counties.
- 9% would be workers who commute to urban areas within the county where they reside.
- 7% would involve intercounty commuters outside of the Portland tri-county area.

Reductions in intercity commuting are likely to have fairly small effects on I-5 traffic congestion. Reducing the drive-alone rate for intercity commuters to 65% might free up about 5% of I-5's capacity over most of its length. To the north of Woodburn, such a reduction might free up about 9% of the freeway's capacity.

Intercity commuting in the Willamette Valley is driven in large part by proximity to the major employment centers in the valley. The major centers and the cities most isolated from them have the highest percentages of internal commuting (>65%). The cities that are located nearest the major job centers have the lowest rates of internal commuting (35% or below).

Overall jobs-housing balance appears to have little effect on commuting. Only among cities located near the major employment centers, does there appear to be a relationship between the ratio of jobs to workers in a city and the amount of intercity travel. Even for those cities it appears to be weak. More study is needed to determine the amount of effect and the potential consequences of public actions to alter jobs-housing balance.

APPENDIX
METHODOLOGY FOR ESTIMATING 1996 INTERCITY COMMUTE TRAFFIC VOLUMES ON INTERSTATE 5

Estimates of 1996 commuter flows and daily and peak hour commuter traffic were developed from the 1990 Census Transportation Planning Package data. This appendix describes the methods used to develop the 1996 estimates.

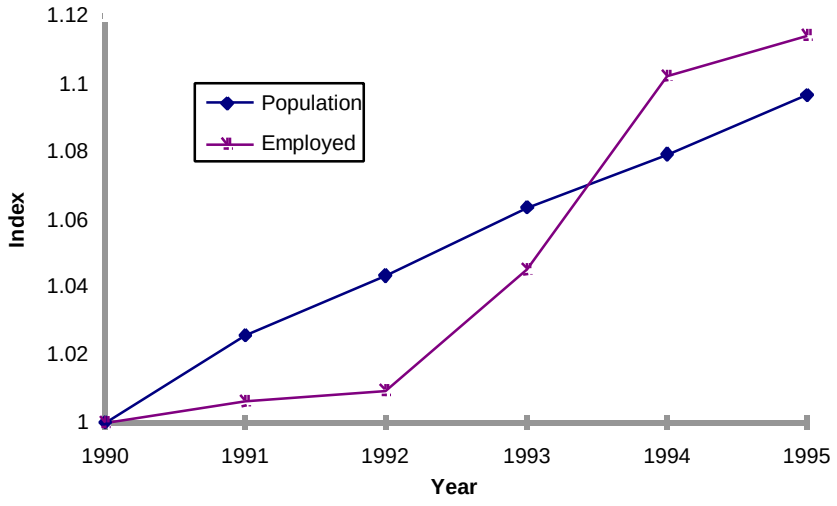
Updating Commuter Flows

1996 commuter flows were estimated by scaling the 1990 tables of daily commuter flows and peak commuter flows by the rates of population and employment change in each of the analysis zones. The population growth rate of the Willamette Valley analysis zones was used to adjust the number of commuters originating from each zone. Between 1990 and 1995 there has been a fairly good correspondence between population and employment growth rates. This is shown in *Figure A1*.

Figure A1

Indexed Changes in Oregon's Population and Employment, 1990 - 1995

Source: PSU; Employment Department



Employment growth rates of the Willamette Valley analysis zones were used to adjust the numbers of jobs in each analysis zone. Changes in commuters and jobs were balanced for the origin-destination trip matrix using the Furness method. The balancing was done on a matrix covering all origin-destination pairs in the valley, not a partial matrix like the ones included in this report. The results are shown in *Table A1*.

Table A1

1996 Estimated Total Number of Willamette Valley Commuters by City

Residence	Workplace									Residence Total
	Portland	West Metro	Southeast Metro	Gresham	McMinn-ville	Salem Keizer	Albany	Corvallis	Eugene Springfield	
Portland (4)	**177,328**	18,638	12,442	6,987	139	593	34	26	102	216,290
West Metro (3)	49,236	**69,388**	7,064	708	160	620	9	60	60	127,303
SE Metro (10)	33,047	8,536	**26,742**	1,047	65	556	30	41	63	70,127
Gresham (5)	23,099	1,508	1,705	**13,245**	17	43	20	18	13	39,668
McMinnville (8)	230	405	71	-	**5,901**	203	-	19	8	6,836
Salem-Keizer (17)	1,862	1,056	702	61	383	**61,112**	767	412	213	66,568
Albany (22)	102	18	10	-	-	634	**9,967**	2,383	64	13,178
Corvallis (20)	102	73	18	19	31	302	1,105	**17,795**	162	19,606
Eugene-Springfield (26)	376	36	57	12	-	224	143	272	**78,439**	79,559
Columbia Co. (1)	5,552	915	239	54	12	26	-	-	8	6,806
Washington Co. (2)	9,449	17,707	1,247	189	104	135	-	38	22	28,891
Rural Portland (6)	7,519	1,060	610	1,743	-	37	-	-	9	10,978
NW Clackamas Co. (9)	14,816	4,179	9,531	1,083	15	389	7	-	9	30,029
SE Clackamas Co. (12)	5,063	774	4,459	681	6	112	-	10	14	11,119
Sandy (11)	3,492	342	694	2,117	-	37	-	-	-	6,682
Yamhill Co. (7)	2,130	3,054	622	24	3,554	787	15	56	11	10,255
Molalla - Silverton (14)	1,254	715	1,013	91	20	1,603	25	15	8	4,741
Woodburn (13)	892	957	1,069	20	10	816	26	-	6	3,796
North Santiam (18)	154	38	41	4	33	3,747	766	119	11	4,913
Rural Salem (16)	149	48	129	24	37	6,501	120	26	34	7,069
Polk Co. (15)	298	63	93	11	236	4,878	280	514	38	6,412
Rural Albany (21)	13	3	15	-	8	184	2,136	1,124	42	3,526
Linn County (23)	99	25	19	10	-	562	3,128	1,278	1,460	6,581
Benton Co. (19)	36	28	7	-	6	146	294	5,135	195	5,848
Junction City - Veneta (24)	51	-	10	-	-	26	44	72	5,297	5,500
Rural Eugene (25)	18	-	7	-	-	24	-	16	5,356	5,421
McKenzie - Marcola (27)	-	-	-	-	-	8	-	27	2,949	2,983
SE Lane County (28)	-	-	-	-	-	-	8	18	2,805	2,831
Cottage Grove - Creswell (29)	8	-	-	-	-	10	3	-	3,141	3,162
Workplace Total	336,374	129,569	68,616	28,130	10,736	84,318	18,926	29,473	100,537	806,680

Source: 1990 Census Transportation Planning Package adjusted by population and employment changes

Converting Commuter Flows to Traffic Flows

Since the Census reports the normal work location of workers and not work trips, adjustments were made to the 1996 worker flow estimates to yield estimates of daily and peak hour trips. A recent USDOT report[13] identifies adjustment factors for the development of transportation models. Total commuter flows were multiplied by a factor of 0.82 to reflect absenteeism and a factor of 2 to estimate average daily commute traffic. For cells in the 1990 total commuter matrix that had fewer than 20 entries, a default mode split of 85% drive-alone commuters was used (the Willamette Valley average).

Peak hour commuter vehicle trips were estimated similarly, although the numbers were not doubled as they were to compute daily trips. Peak hour trips were estimated by

[13] U.S. Department of Transportation, Federal Highway Administration, "Transportation Planner's Handbook on Conversion Factors for the Use of Census Data", May 1996, Prepared by COMSIS Corporation

assumed that 85% of the commuters who leave for work between 6:30 and 8:30 are on the road during the peak hour.

Assignment of Traffic to I-5

Traffic was assigned to I-5 based on judgment of what would be the most likely route that interurban commuters would take. Commuter flows were either assigned or not assigned to I-5. No partial assignments were made. Following are the assignments of flows to northbound and southbound (to work) traffic on I-5.

Northbound I-5 traffic:
Cottage Grove – Creswell (area 29)
SE Lane County (area 28)
Eugene-Springfield (area 26): but not commuters to Eugene-Springfield
Junction City - Veneta (area 24): but not commuters to Eugene-Springfield, Corvallis, and Albany
Rural Eugene (area 25): but not commuters to Eugene-Springfield, Corvallis, and Albany
McKenzie - Marcola (area 27): but not commuters to Eugene-Springfield
Benton County (area 19): but not commuters to Corvallis or Albany
Linn County (area 23): but not commuters to Corvallis or Albany
Corvallis (area 20): but not commuters to Corvallis or Albany
Rural Albany (area 21): but not commuters to Corvallis or Albany
Albany (area 22): but not commuters to Corvallis or Albany
Polk County (area 15): but not commuters to Salem-Keizer
North Santiam (area 18): but not commuters to Salem-Keizer
Rural Salem (area 16): but not commuters to Salem-Keizer
Salem-Keizer (area 17): but not commuters to Salem-Keizer
Woodburn (area 13)
Molalla – Silverton (area 14)

Southbound I-5 traffic:
Portland (area 4): no assignment made in Portland metropolitan area
West Metro (area 3): no assignment made in Portland metropolitan area
Southeast Metro (area 10): no assignment made in Portland metropolitan area
Gresham (area 5): no assignment made in Portland metropolitan area
Columbia County (area 1): no assignment made in Portland metropolitan area
Washington County (area 2): no assignment made in Portland metropolitan area
Rural Portland (area 6): no assignment made in Portland metropolitan area
NW Clackamas County (area 9): no assignment made in Portland metropolitan area
SE Clackamas County (area 12): no assignment made in Portland metropolitan area
Sandy (area 11): no assignment made in Portland metropolitan area
Woodburn (area 13)
Molalla - Silverton (area 14)
Rural Salem (area 16): but not commuters to Salem-Keizer
Salem-Keizer (area 17): but not commuters to Salem-Keizer

North Santiam (area 18): but no assignment north of Albany
Albany (area 22): but not commuters to Corvallis or Albany
Rural Albany (area 21): but not commuters to Corvallis or Albany
Corvallis (area 20): but not commuters to Corvallis or Albany
Benton County (area 19): but not commuters to Corvallis or Albany
Linn County (area 23): but not commuters to Corvallis or Albany

Comparison with I-5 Capacities

The maximum peak-hour directional volumes assigned to I-5 were compared with the freeway capacities inventoried in ODOT's Highway Performance Monitoring System database. Capacities are reported for one direction of travel.

Comparison to Origin-Destination Survey Results

In 1994, an origin-destination (O-D) survey was conducted in the Willamette Valley. This survey was commissioned by ODOT and the metropolitan planning organizations to provide information for transportation models. The recent use of the O-D survey data for modeling of the proposed Newberg-Dundee bypass provided commuter traffic estimates that allowed a limited check of the estimates of Willamette Valley commuter traffic to be performed. The Newberg-Dundee bypass analysis estimated the daily traffic of people commuting from McMinnville and Portland to be 380 vehicles. The 1996 estimate of McMinnville-Portland commuter traffic using Census information was 367 vehicles.