

2018 Regional Transportation Plan



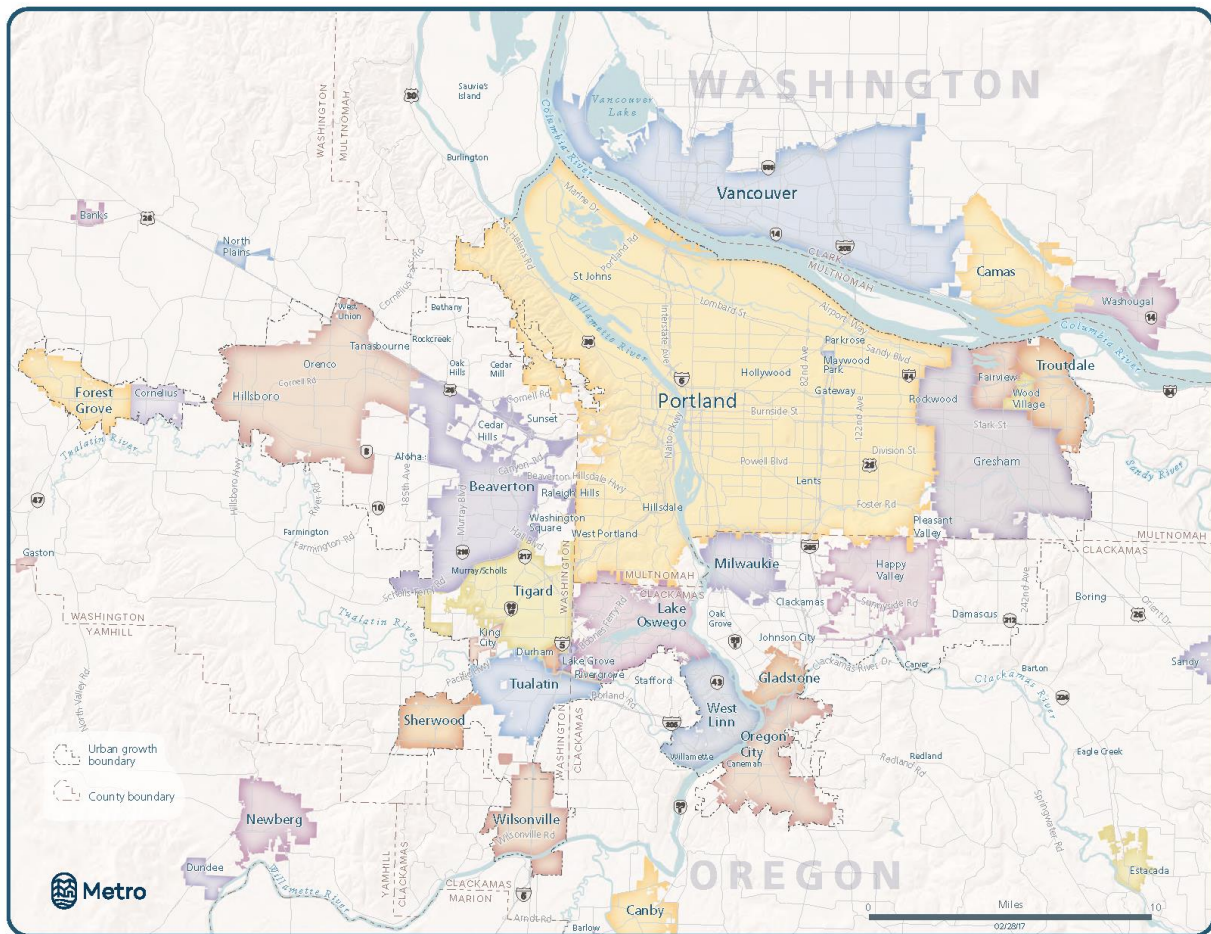
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2018 Regional Transportation Plan

Chapter 4

Our Growing and Changing Region

December 6, 2018



Metro serves more than 1.5 million people in Clackamas, Multnomah and Washington counties. The agency's boundary encompasses 24 cities – from the Columbia River in the north to the bend of the Willamette River near Wilsonville, and from the foothills of the Coast Range near Forest Grove to the banks of the Sandy River at Troutdale.

Among its other responsibilities, Metro is authorized by Congress and the State of Oregon to coordinate and plan investments in the transportation system for the three-county area. Metro uses this authority to expand transportation options, make the most of existing streets and improve public transit service. As the designated metropolitan planning organization, Metro works collaboratively with cities, counties and transportation agencies to decide how to invest federal highway and public transit funds within its service area. It creates a long-range transportation plan, leads efforts to expand the public transit system and helps make strategic use of a small subset of transportation funding that Congress sends directly to metropolitan planning organizations.

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4.1 INTRODUCTION

Our region continues to grow and change

The greater Portland region is an extraordinary place to call home. It is known for its unique communities, a diverse and growing economy and a world-class transportation system. The region is surrounded by stunning natural landscapes and crisscrossed with a network of parks, trails and natural areas within a walk, bike ride or transit stop from home.

Part of the broader Pacific Northwest region, the Portland-Vancouver metropolitan area is one of four international gateways on the West Coast. In this role, the region serves as a freight gateway to domestic and international markets for businesses located throughout the state of Oregon, southwest Washington, the mountain states and the midwest.

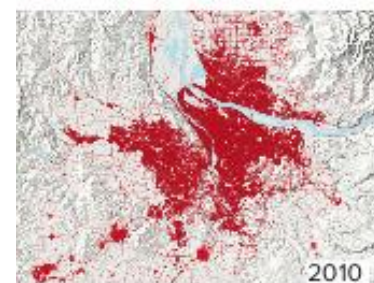
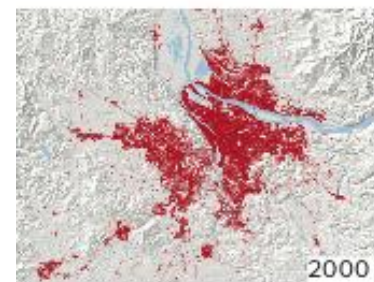
Over the years, communities throughout the region have taken a collaborative approach to planning that has helped make the region one of the most livable in the country.

Every day, the region's 2.4 million people have places to go – to work or school, to doctors and grocery stores and parks and back home again. All these trips, along with our transportation system, knit the region together – from Forest Grove to Troutdale, Vancouver and Portland to Wilsonville and every community in between.

Because of our dedication to planning and working together to make local and regional plans a reality, we have set a wise course for managing growth – but times are challenging. The region is growing, our economy is expanding, and emerging technologies are changing how we do business and get around.

Housing affordability, climate change, racial disparities, traffic deaths and life changing injuries, and traffic congestion demand new kinds of leadership, innovation and thoughtful deliberation and action to ensure our region remains a great place to live, work and play for everyone. In collaboration with city, county, state, business and community leaders, Metro has researched how land use and transportation policies and investments can be leveraged to respond to these complex and interrelated challenges at a regional scale.

Land development, 1910-2010



The region expects to welcome more than 500,000 new residents – about half from growing families – and more than 350,000 new jobs within the urban growth boundary by 2040.

Welcome to the big cities

Since the adoption of the 2040 Growth Concept in 1995, the greater Portland region has moved from a collection of interconnected towns to become a major metropolitan area.

If you include our connected Southwest Washington neighbors, we are the twenty-third largest metropolitan area in the United States, with 2.4 million people living here and using our system of throughways, roads, bridges, transit, bikeways, sidewalks and trails.

Portland, Ore. and Vancouver, Wash. metropolitan area



Below is a sample of other metropolitan areas, when they reached 2.4 million people and what 20 years of growth looked like for them.

Phoenix, Ariz. metropolitan area: 2.4 million people by early 1990s



San Diego County, Calif.: 2.4 million people by late 1980s



Minneapolis-St. Paul, Minn. metropolitan area: 2.4 million people by late 1980s



Seattle, Wash. metropolitan area: 2.4 million people by late 1980s



Atlanta, Ga. metropolitan area: 2.4 million people by mid-1980s



Source: 2014 Metro Urban Growth Report, 1990 and 2010 U.S. Decennial Census and extrapolated estimates



4.1.1 Chapter organization

This chapter provides a snapshot of current regional growth trends and existing conditions and outlines key transportation challenges the plan will address. The chapter also highlights opportunities for building a regional transportation system that reflects our values and vision for the future.

4.1 Introduction: This section introduces the chapter.

4.2 Who we are: This section provides an overview of population growth; demographic changes for race, ethnicity and age; where people live and work; employment growth and jobs.

4.3 How we get around: This section provides a snapshot of how people in the region get around – driving, transit, walking and bicycling.

4.4 How we move goods and services: This section provides an overview of how goods and services move in the region and how the region is competing in a global economy,

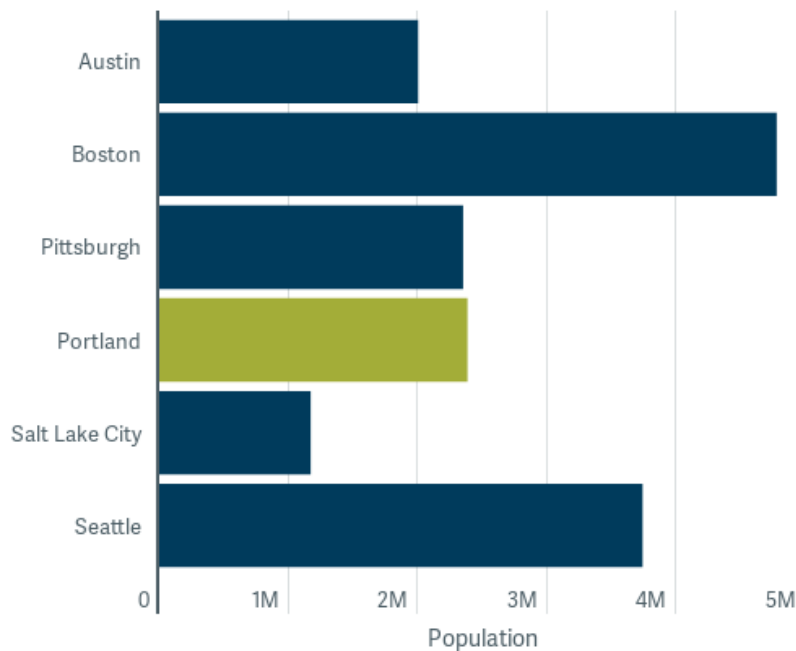
4.5 How we keep our environment healthy: This section describes current efforts and strategies to protect historic and cultural resources and keep the air, water and habitat in the greater Portland region healthy.

4.6 How the system is working – challenges and opportunities ahead: This section describes the major challenges the region is facing and the opportunities that each challenge presents to achieve the region’s vision for funding the transportation system we need; updating and maintaining aging infrastructure; addressing climate change and air quality; addressing congestion and reliability; eliminating fatal and life-changing motor-vehicle crashes; addressing earthquake vulnerability, security and emergency services; filling gaps in transit, biking and walking connections; addressing housing and transportation affordability and displacement; addressing social inequity and disparities; and proactively addressing technological change.

4.2 WHO WE ARE

The Portland metropolitan region is growing and changing, shaped by a global economy, a warming planet, demographic changes, public health and safety concerns and changes in how we live and travel. By population, Portland is the 23rd largest metropolitan area in the country. The region has about half as many people as Boston and twice as many people as Salt Lake City. The greater Pittsburgh and San Antonio regions are about the same size.

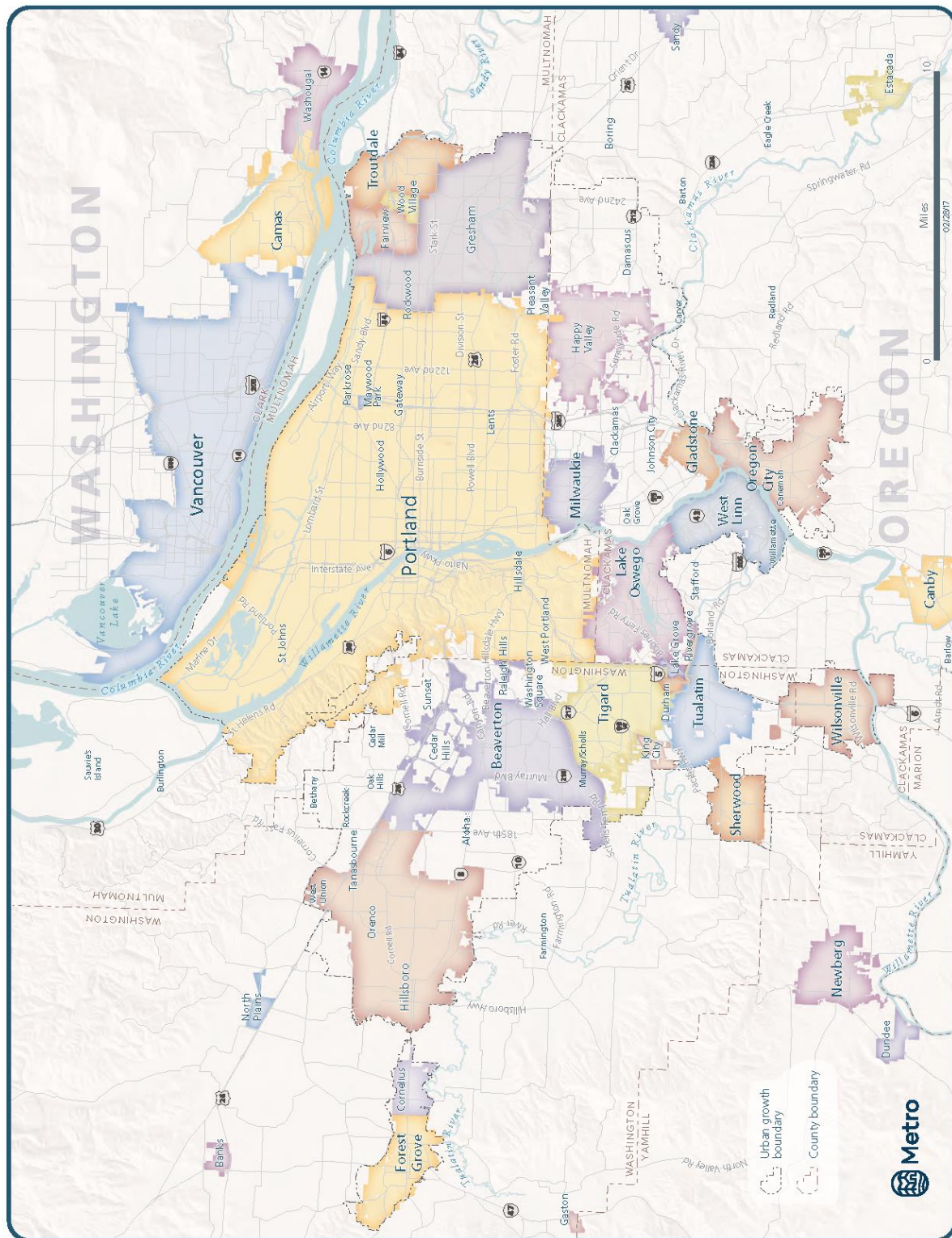
Figure 4.1 Population by metropolitan area, 2017



Source: 2013-2017 ACS 5-year estimates

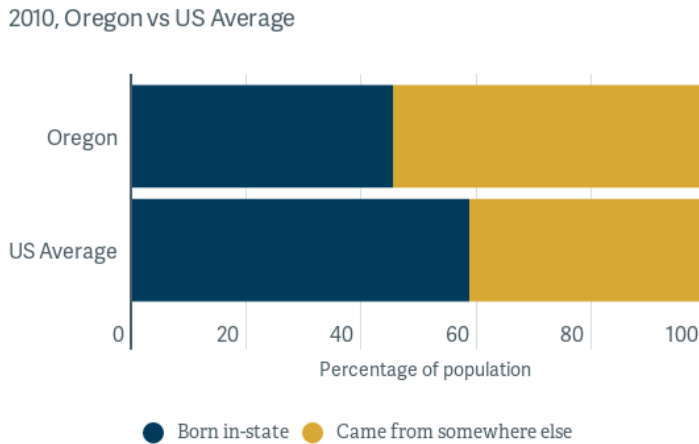
The Oregon portion of the Portland-Vancouver metropolitan region encompasses 24 cities and 3 counties as shown on the next page. Metro's urban growth boundary includes 403 square miles and more than 1.5 million residents.

Figure 4.2 Cities and counties in the greater Portland region, 2018



Our region continues to grow. New forecasts show that between 2015 and 2040, more than 500,000 additional people are expected to live within the region’s urban growth boundary.¹ But how much are we growing, and how fast? And where are these new people coming from? In short, many are coming from somewhere else in the country, and it's adding up. Nationally, 68 percent of Americans live in the state where they were born, however in Oregon 51 percent of population came from somewhere else.

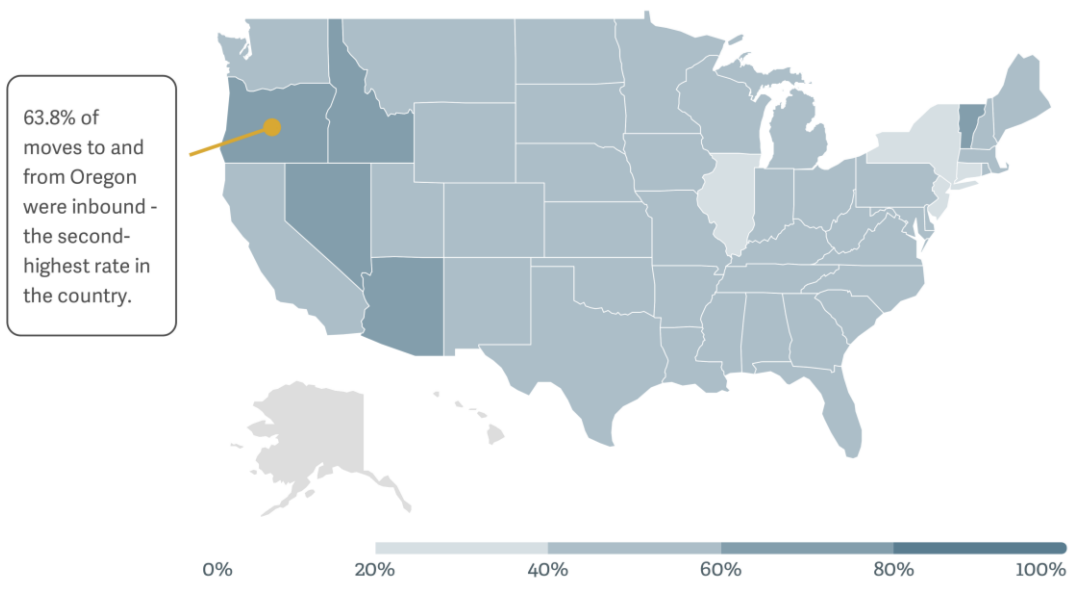
Figure 4.3 Percent of population by location of birth, 2010



Data: *Lifetime Mobility in the United States: 2010*. ACS Briefs, Nov. 2011

Oregon is the number one state for inbound migration for the second year in a row.

Figure 4.4 Top ten states for inbound migration, 2017-2018

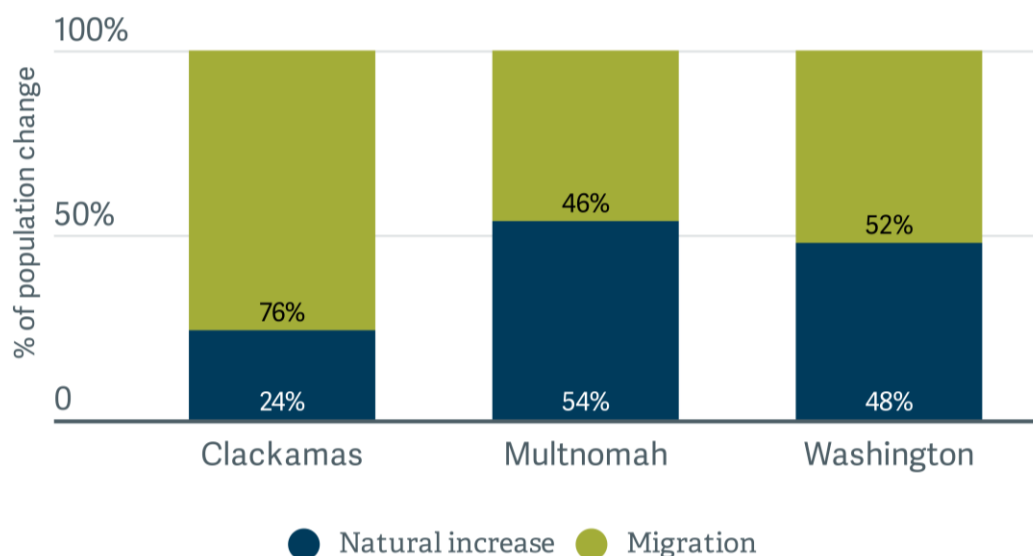


Source: 2018 National Movers Study. United Van Lines, 2018.

¹ Ordinance No. 16-1371, Metro, October 2016

But different parts of the region are experiencing different sources of growth. For instance, between 2000 and 2009, Clackamas and Washington counties primarily grew due to people moving from other counties around the country. Most of Multnomah County's growth in that period was the result of natural increase – in other words, more people being born than dying in the county, as shown in **Figure 4.5**.

Figure 4.5 Source of population increase in the three counties, 2000-2009

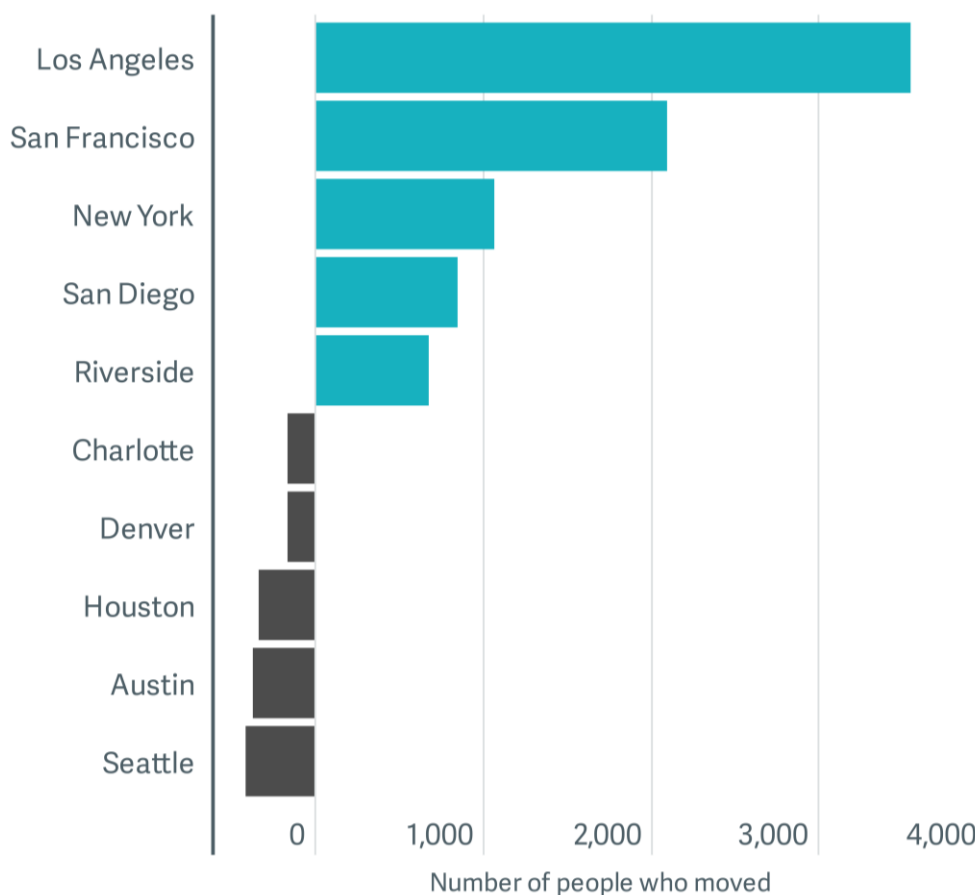


Data: US Census, Table NST-EST2009-04

Most of the people are coming from California. From 2007-08 to 2009-10, four of the top five cities contributing to the Portland region's growth were Californian. (New York City was the only non-Californian city in the top five.) On the other hand, the region is losing people to Seattle, Austin and Houston.

Figure 4.6 Net migration into the 7-county Portland region

Of the 50 major metropolitan areas, top & bottom 5.



Data: IRS Exemptions/courtesy of Josh Lehner, Oregon Office of Economic Activity, 2013.

While this growth brings jobs and opportunity, it also creates new challenges; more people will be using the region's transportation system to get to work, school, shopping and other daily activities. According to the 2011 Oregon Household Activity Survey, the average household in the Portland region makes 9.2 trips per day with an average trip length of 4.4 miles for trips taken by car.

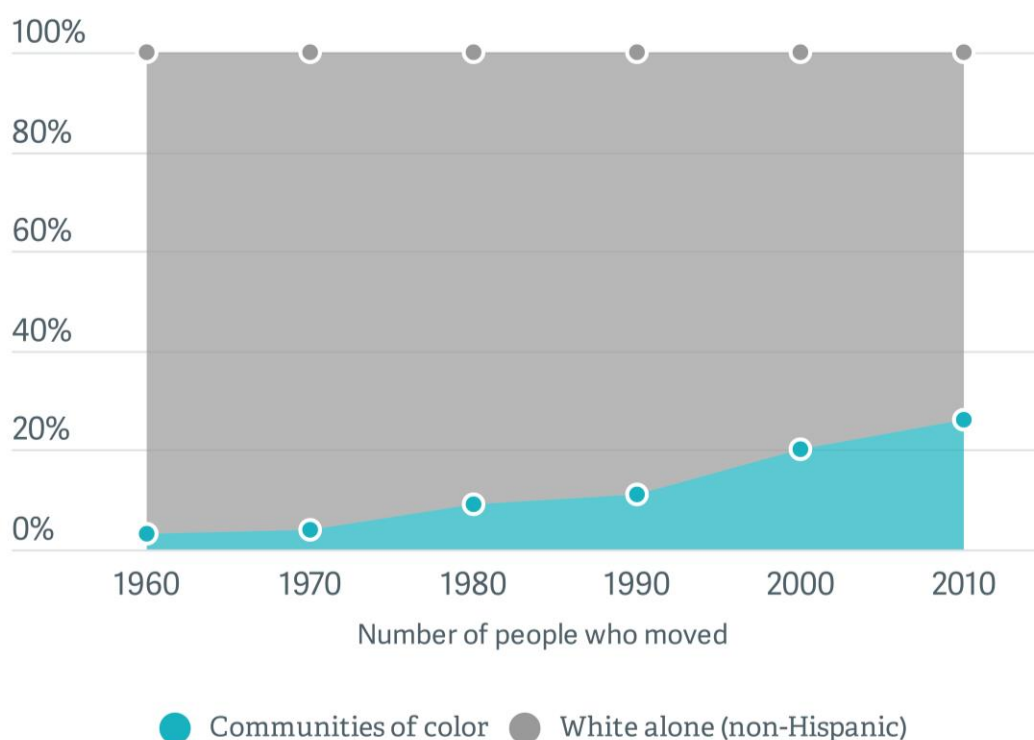
4.2.1 Demographic changes

Our population and communities continue to change. While the greater Portland region historically has had less racial diversity than other American cities, the region increasingly reflects the diversity of the country. However, the specific historic and systemic exclusion of and bias against African Americans is still reflected in the makeup of our population. In 2010, the

population of greater Portland was 71 percent White compared to 64 percent nationally, and 4 percent African American compared to 12 percent nationally.

Also of note is the difference in Hispanic/Latinx population (10 percent for the region, 16 percent nationally) and those whose racial/ethnic identity is not easily categorized by the U.S. Census categories (those grouped as “other”: 6 percent for the region, 2 percent nationally). Communities of color are growing in their share of the Portland region's population, and they are less concentrated in Multnomah County than they once were.

Figure 4.7 Communities of color share of population in Portland tri-county area, 1960-2010



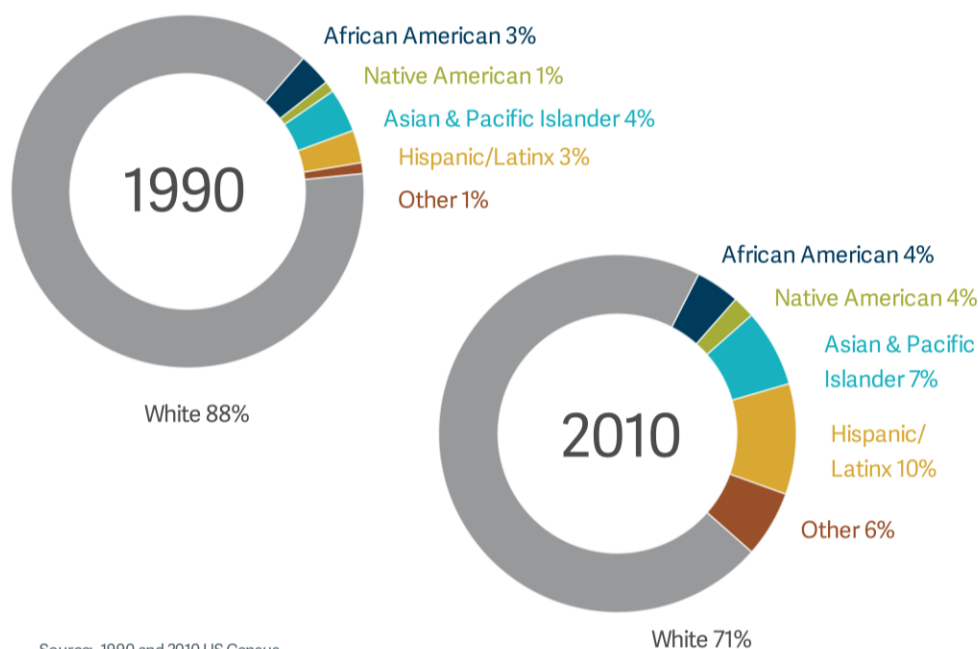
Data: US Census. Note that Census counts did not include Hispanic as a category until 1980.

In 1960, Clackamas and Washington counties had a combined population of 205,275. According to that year's Census, 153 of them were Black and 965 were neither White nor Black. In Multnomah County, about 16,000 people of the county's total population of 523,000 people were Black – the vast majority of the state's 18,000 Black residents. By 2010, Multnomah County had 530,000 White, non-Hispanic residents – about 72 percent of its total population of 735,334 residents. The Black population had grown to 41,000 residents, still the majority of Oregon's 69,000 Black residents but not the overwhelming majority it was four decades earlier.

In 2010, about 220,000 residents of Clackamas and Washington counties identified as Hispanic or a race other than White – about a quarter of their total population. In 1980, the first year the Census reliably tracked Hispanic population figures; there were about 21,000 Hispanics in greater

Portland – about 2 percent of the tri-county population. By 2014, that number was estimated to be 202,000 – close to 12 percent. Overall, communities of color saw their share of greater Portland's population rise from barely 3 percent in 1960 to almost 26 percent in 2010.

Figure 4.8 Race and ethnicity in the 7-county greater Portland region, 1990 and 2010

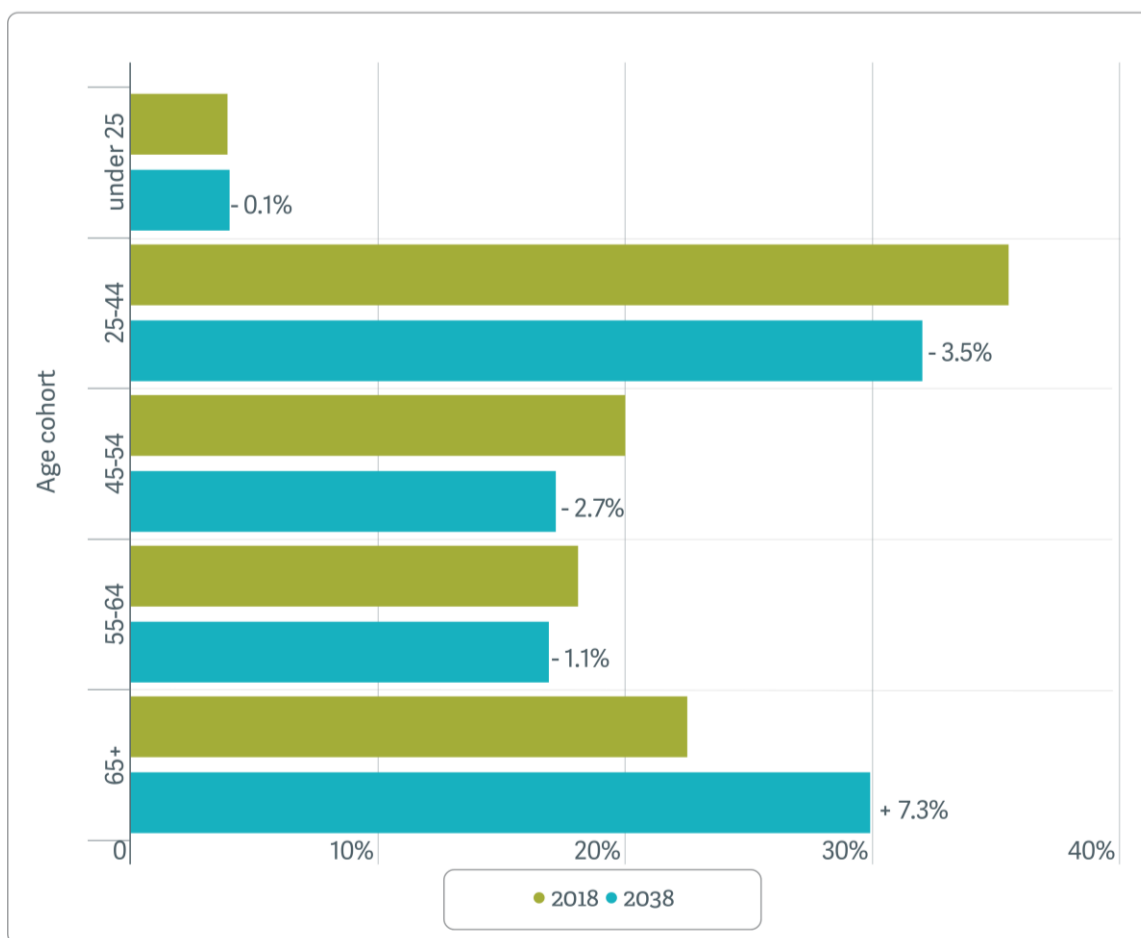


Source: 1990 and 2010 US Census

Source: 1990 and 2010 US census

In the seven-county Portland-Vancouver-Hillsboro metropolitan statistical area (MSA), which includes the greater Portland area, there will be a significant growth in the older adult (65+ years) population between 2018 and 2038 of over 7 percent, compared to a reduction for other age groups as shown in **Figure 4.9**.

Figure 4.9 Age cohorts as a percentage of total population in the 7-county greater Portland region, 2018 and 2038



Source: 2018-38 Portland-Vancouver-Hillsboro, OR-WA MSA Forecast, Metro Research Center, November 2017

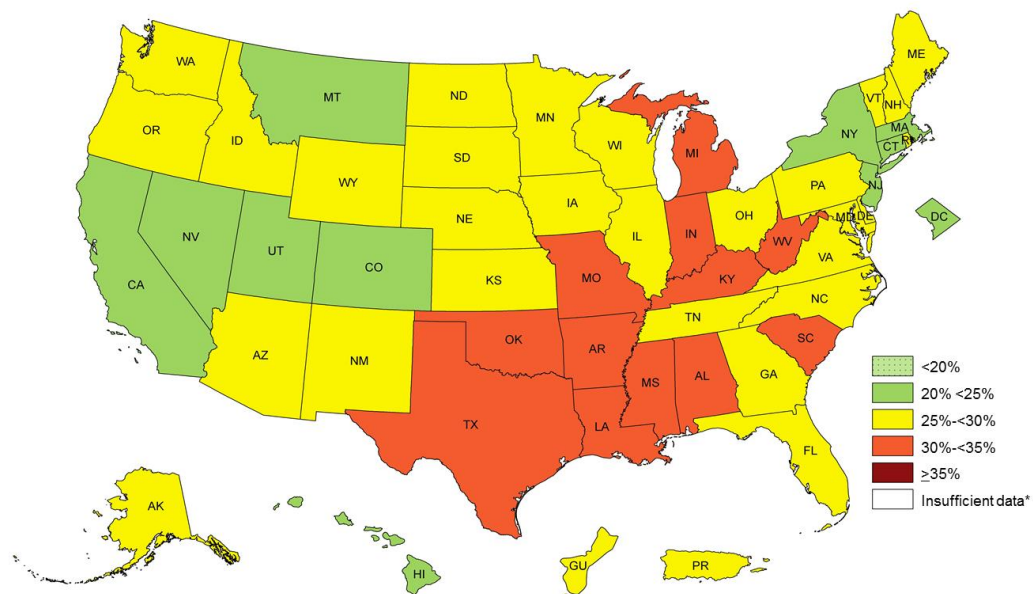
The changing demographics of the region for age follow a national trend of aging – the percent of the population over 65 continues to increase. Today, more than 20 percent of the region’s population is over the age of 65. By 2038, nearly 30 percent of the region’s population is forecast to be older than 65.

Public health is a growing concern

Interest in the connection between urban planning and active living has continued to grow since the 1990s, an outcome of a growing interest in “smart growth,” a movement to integrate land use, transportation and public health planning. Studies since then report positive effects on human health in neighborhoods built to encourage walking and biking. We face a trend of rapidly rising

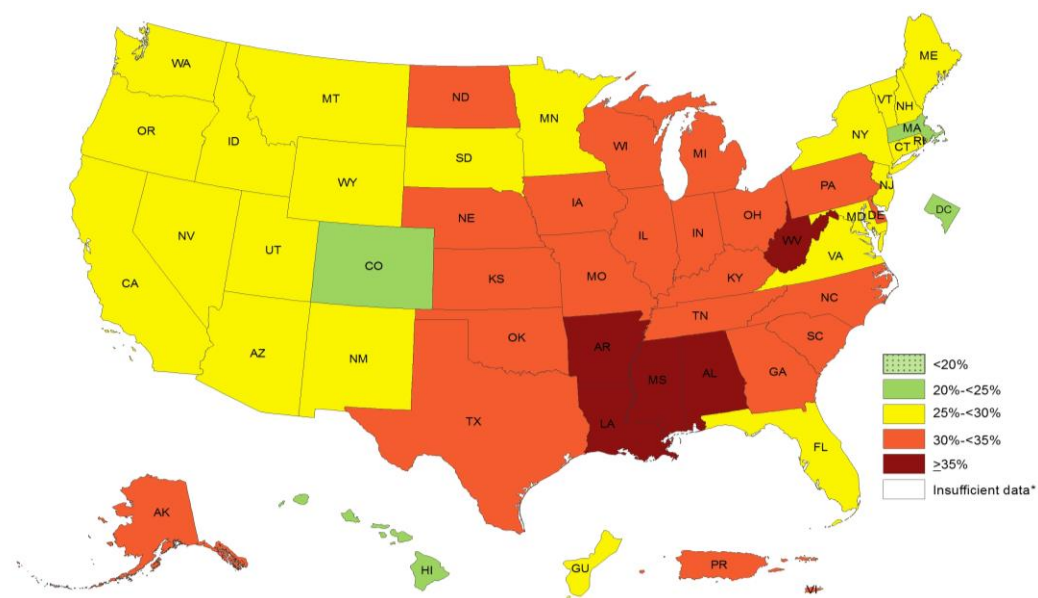
rates of chronic disease associated with obesity, being overweight and sedentary lifestyles, conditions that public health officials now describe as epidemic.

Figure 4.10 Prevalence of self-reported obesity among U.S. adults by state and territory, 2011



Source: Center for Disease Control Behavioral Risk Factor Surveillance System

Figure 4.11 Prevalence of self-reported obesity among U.S. adults by state and territory, 2016



Source: Center for Disease Control Behavioral Risk Factor Surveillance System

In addition, there is a well-established connection between exposure to air pollution from transportation systems and increased risk of chronic diseases such as asthma, stroke, heart disease and cancer that are related to vehicle emissions. National studies have demonstrated these negative health impacts affect people of color and lower-income households disproportionately. See Section 4.5 for more information about air quality.

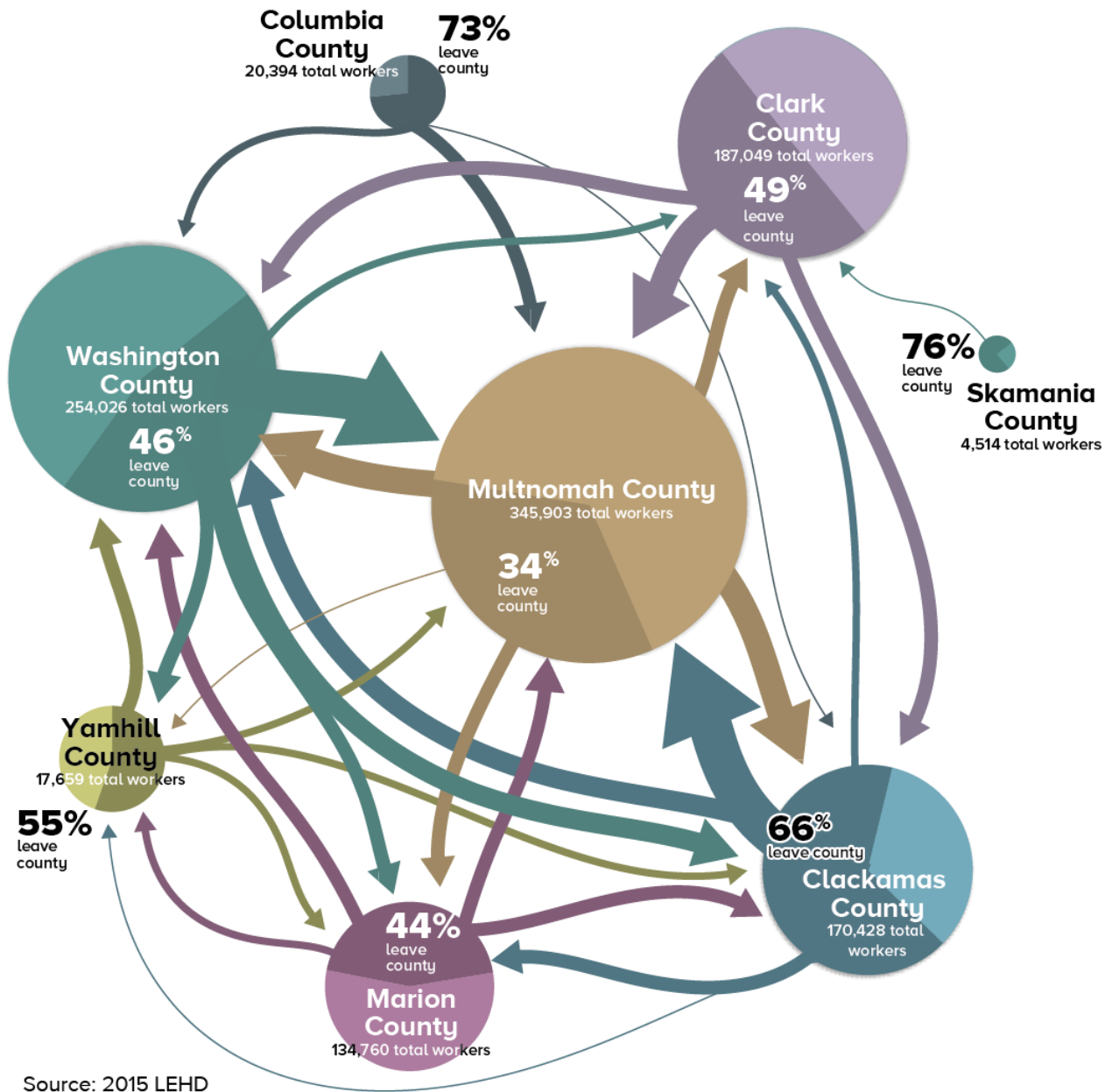
The greater Portland region has long embraced policies to create walkable communities and reduce vehicle miles traveled and related emissions, based on expected land use and transportation benefits. Inclusion of public health goals, objectives and performance measures in the RTP supports ongoing efforts to positively impact public health through transportation planning and design. However, more work is needed to expand the region's analytical capability. Additional resources will be required to analyze transportation investments in terms of their public health benefits. The use of health impact assessments and other evaluation tools will be considered moving forward.

4.2.2 Where we live and work

There are differences in where each of us goes every day, providing insight into the region's distribution of housing and jobs as shown in **Figure 4.12**. Take the flow of the daily commute, for example. Multnomah County has the most working residents and the most jobs. According to data from the Census Bureau, two-thirds of working residents in Multnomah County stay in their home county for work. Of those who leave, most head into Washington County, the region's second biggest job center.

For working residents of Clark and Washington counties, it's roughly an even split between working in the county and leaving, with most workers who leave commuting into Multnomah County. Clackamas County sees two-thirds of its working residents commute elsewhere, also mostly to Multnomah County. Washington and Clackamas counties also swap thousands of working residents each day – though not nearly as many commuters as each county send into Multnomah County.

Figure 4.12 Where residents work in the greater Portland region, 2015



4.2.3 Jobs and a growing economy

The region's economy has been marked by job growth, shifts in job types, and growth in traded sector businesses. The greater Portland region employs over a million workers, the fifth largest workforce on the west coast². Prior to about 2011, the region had higher unemployment rates compared to the U.S. as a whole, but since the recovery, Portland's rates have been more in sync with the rest of the nation.

² [Greater Portland Work Book, 2013-14](#)

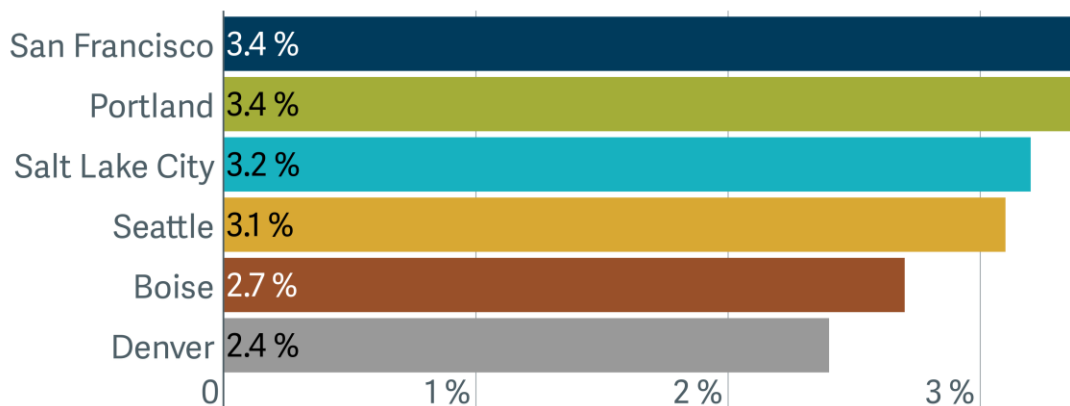
Figure 4.13 Unemployment rate in the greater Portland region, 2000-2017



Data: State of Oregon Employment Department

The region has regained twice as many jobs as it lost in the recession and job growth is up. The region is also attracting a young, highly educated workforce. Over the past year, Portland's growth has been strong – on par with San Francisco as shown in **Figure 4.14**.

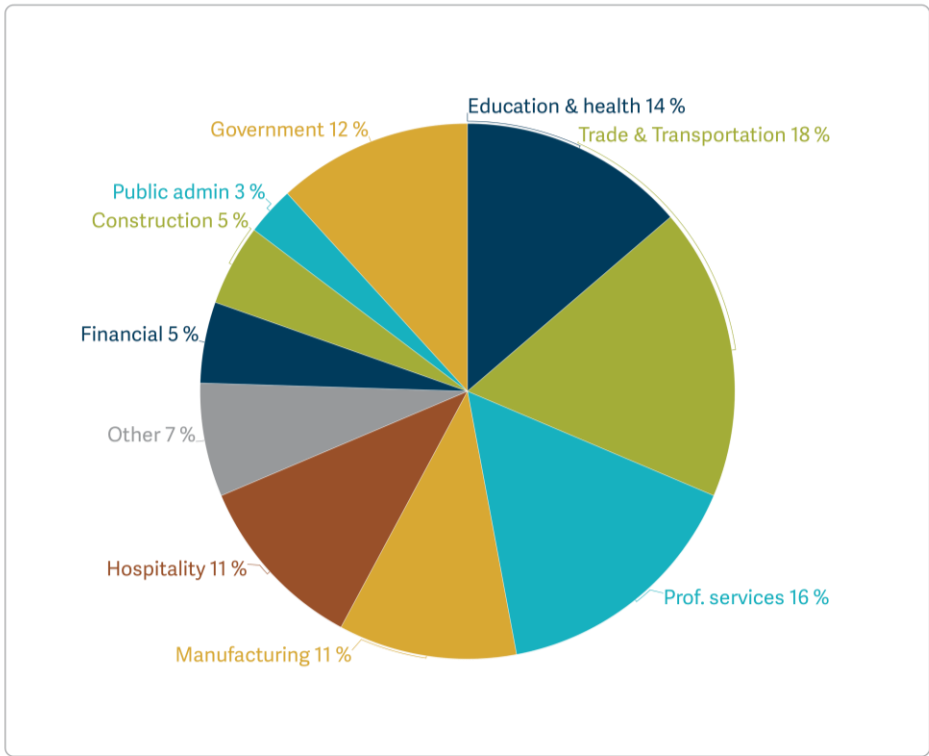
Figure 4.14 Employment growth by metropolitan statistical area, 2014-2015



Data: U.S. Bureau of Labor Statistics

Currently almost half of Portland area residents work in trade and transportation, professional services, and education and health as shown in **Figure 4.15**.

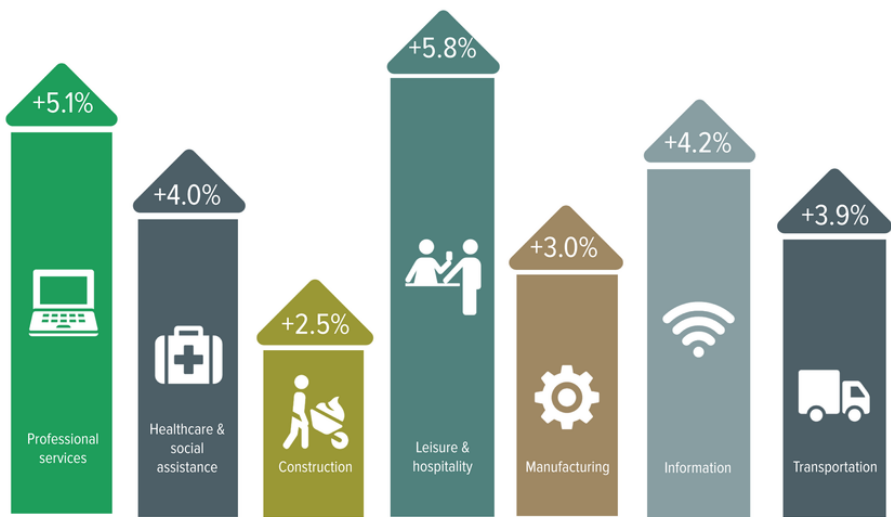
Figure 4.15 Employment by industry for Portland-Vancouver-Hillsboro MSA (Oregon portion only), 2017



Data: State of Oregon Employment Department

Several job sectors are doing exceptionally well in the Portland region, particularly professional and business services and leisure and hospitality. These sectors have been adding workers more quickly than other sectors as the region comes out of the recession.

Figure 4.16 Fastest growing industries in 7-county region, 2014-2015



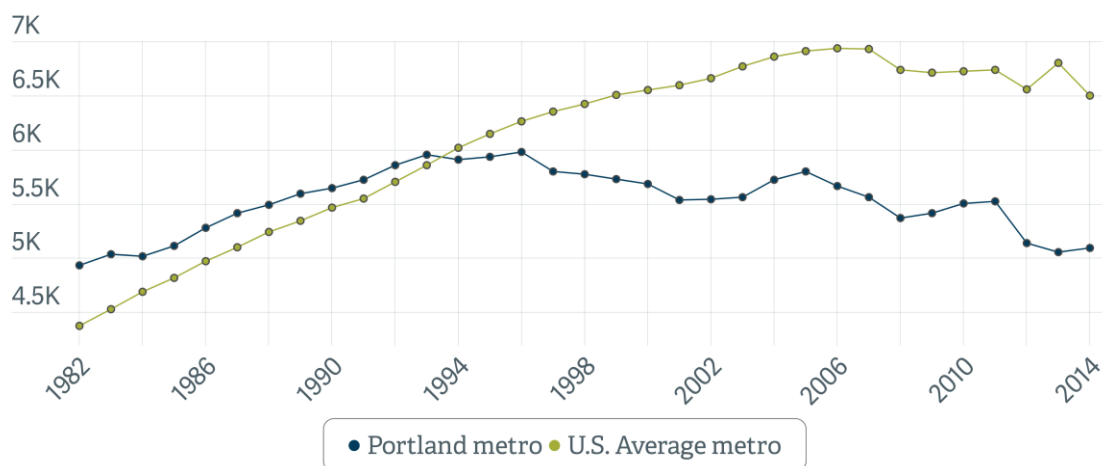
Source: Oregon Employment Department

4.3 HOW WE GET AROUND

4.3.1 Travel

Travel behavior—mode choice, commuting patterns, trip length and frequency—is influenced by a number of factors, including demographics, land use, community design, cost, access, the economy, job locations as well as social and environmental values. On a per-person basis, the Portland region has been driving less since 1996, even as people take about the same number of trips each day. According to the 2015 Texas A&M Transportation Institute’s Urban Mobility Report, the region’s residents drove just 5,000 miles per person in 2014 – that’s nearly 25 percent less than other US metropolitan regions of similar size.

Figure 4.17 Average annual vehicle miles traveled per person, greater Portland region compared to other metropolitan areas, 1982-2014

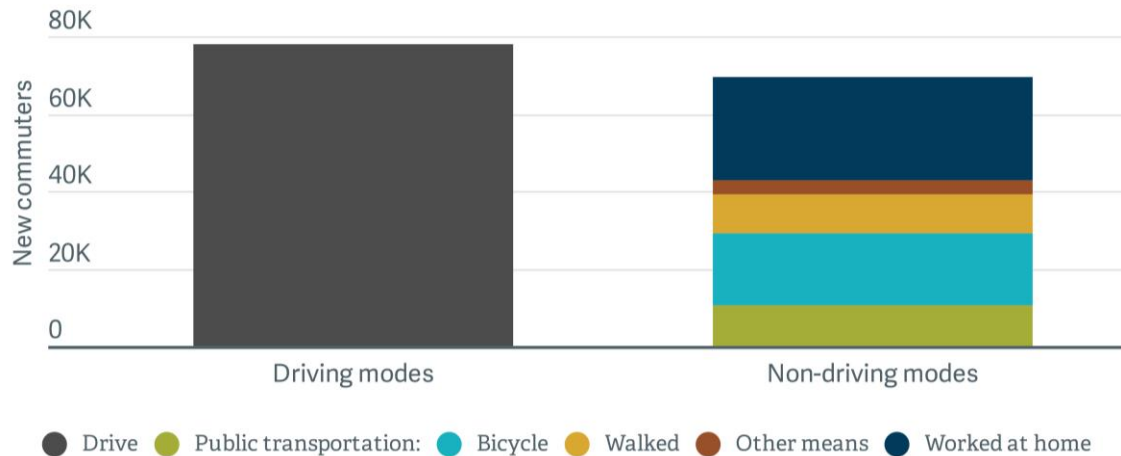


Texas A&M Transportation Institute, Urban Mobility Report

Why are people driving less here? Part of the reason is that people in the Portland region are making different choices about getting around – a reflection of the multimodal options available as defined in the 2040 Growth Concept. US Census estimates from 2014 show that while the national average for drive-alone commuting is 76.4 percent, the Portland region’s average was just 70.7 percent, resulting in associated reductions in greenhouse gas and other vehicle emissions for the region.

Though a growing population invariably means more commuters, just under half of the workers added since 2000 drive to work alone as shown in **Figure 4.18**. The majority are choosing other modes, or working from home.

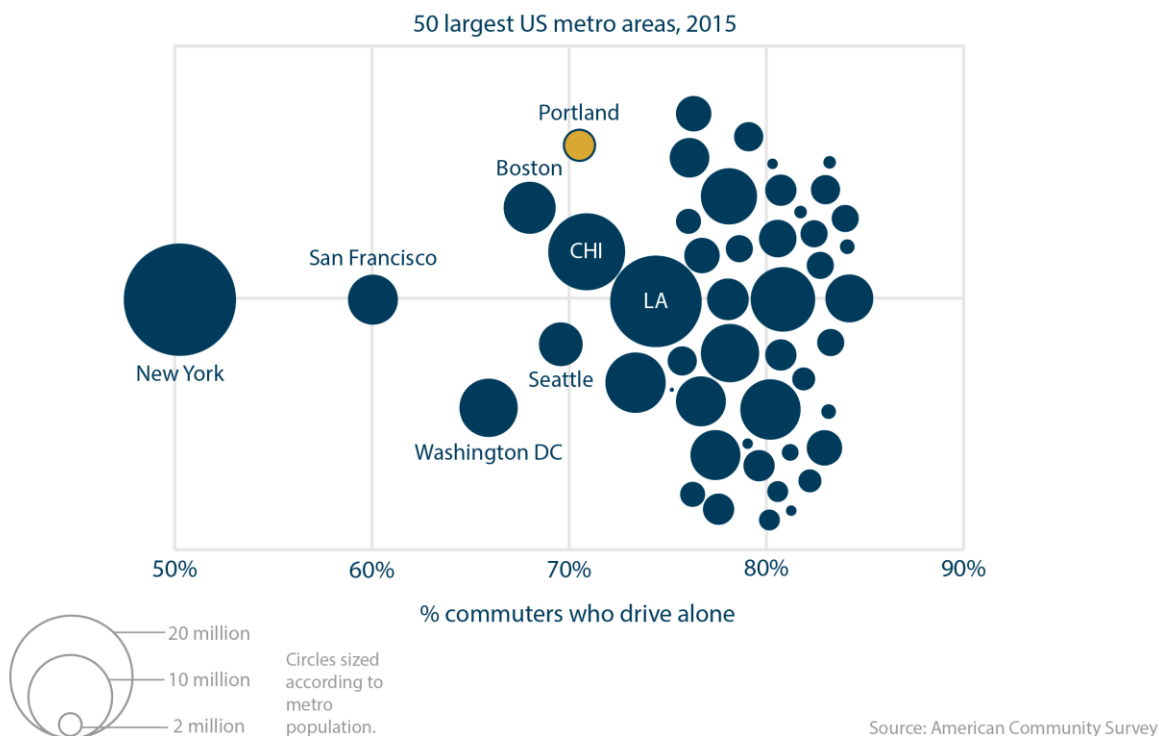
Figure 4.18 Mode share of new commuters in the 7-county MSA, 2000-2015



Data: US Decennial Census and 2015 ACS 5-year estimates.

Figure 4.19 Ranking of drive alone commuting in U.S. metropolitan areas, 2015

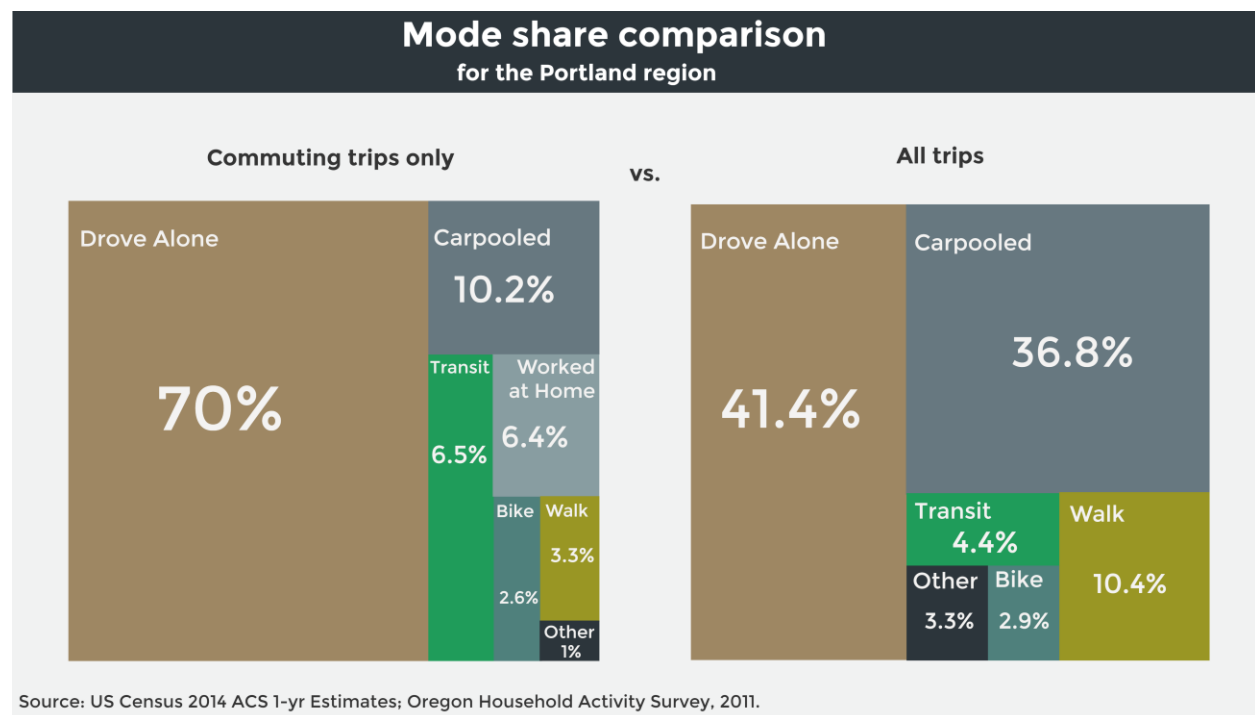
Greater Portland has the 6th-lowest rate of drive-alone commuting.



4.3.2 Mode share

Travel to work has typically been the focus of transportation planning, especially given its prominence in the morning and evening peak periods. However these trips make up a relatively small portion of all the trips taken throughout the region. Nationwide travel for non-work purposes, such as shopping, errands and recreation is growing faster than work travel. In fact, more than 70 percent of the trips taken in the Portland region are for reasons other than school and work.

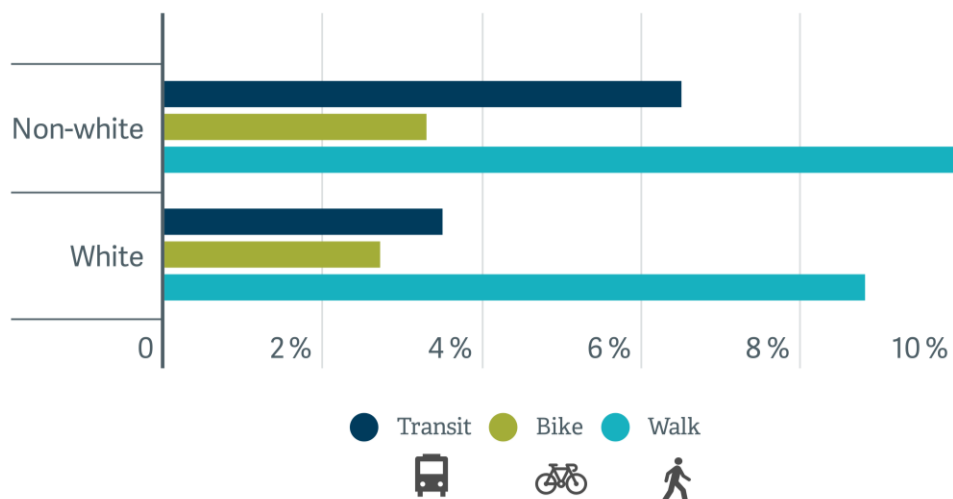
Figure 4.20 Mode share comparison for commute and all trips, 2011



In 2003, Metro’s Regional Travel Options (RTO) program started to target non-commute trips during rush hour and throughout the day as a key strategy for addressing congestion and air quality issues in the region.

Driving is the most predominant way for people in the region to get around. In 2015, more than 80 percent of all trips in the greater Portland region were made by motor vehicle. Communities of Color drive less than White residents in the region.

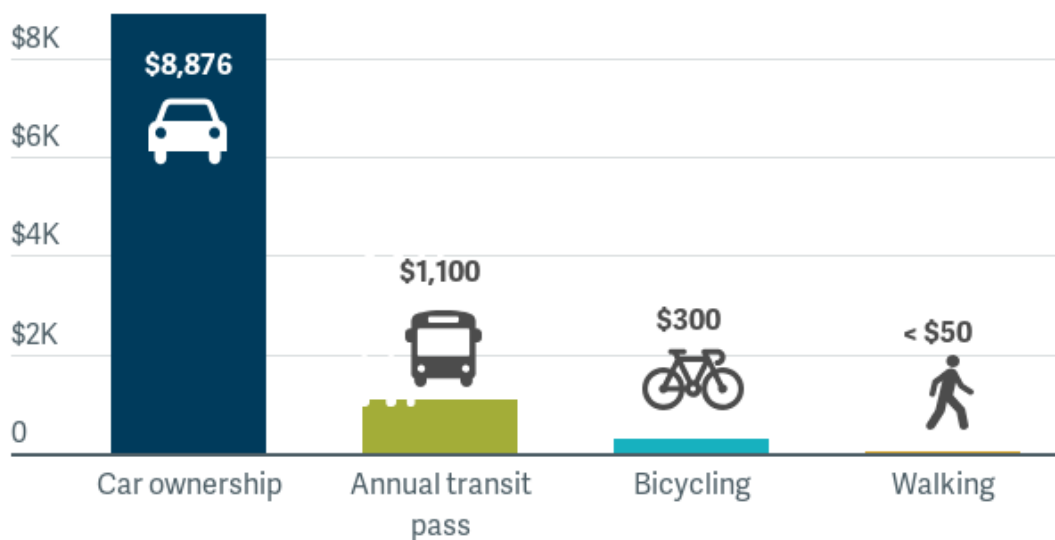
Figure 4.21 Travel modes by non-White and White populations in Oregon, 2011



Source: Oregon Household Activity Survey, 2011

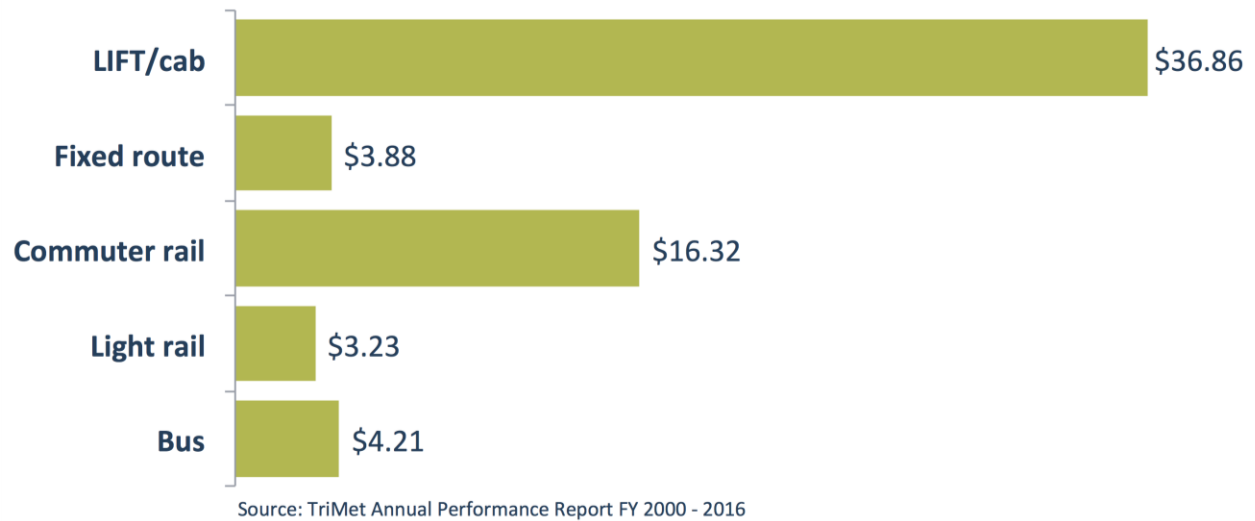
Driving remains the most expensive form of transportation, both for individuals and for society. The average annual cost of owning an automobile is over \$8,000 a year. However, fuel is comparatively cheap, and driving remains a convenient and efficient way to travel in the region.

Figure 4.22 Annual transportation costs by mode, 2014



Sources: "Your Driving Costs," AAA, 2014; TriMet annual transit pass; Todd Litman, Victoria Transportation Institute "Transportation Cost Benefit Analysis II - Vehicle Costs." Note that all costs are estimates.

Figure 4.23 2016 TriMet cost per ride

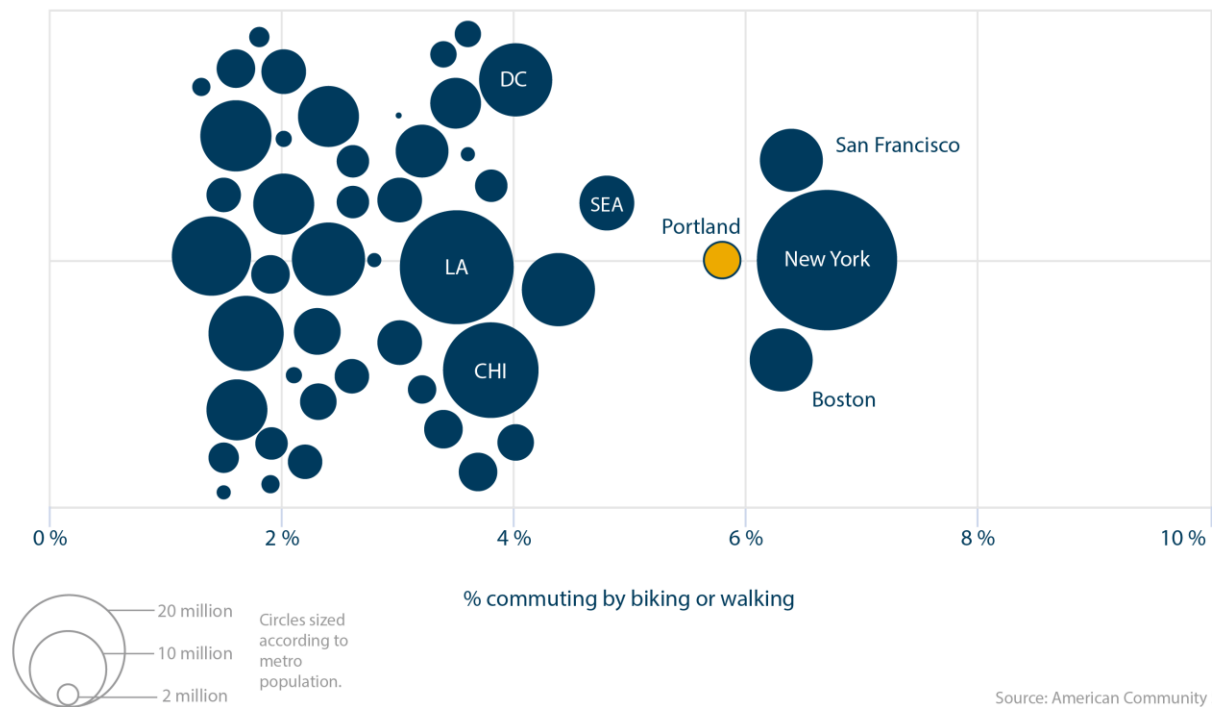


Walking is the most primary form of transportation. Whether an entire trip is done on foot or using a wheelchair or similar mobility device, people must walk for at least a part of every trip, even when the rest of the trip takes place on transit, in a vehicle or on a bicycle. Pedestrian activity thrives where the pedestrian facilities are well connected, safe and attractive—meaning well lit, free of debris and in good repair—and where there are frequent protected crossings. Therefore, it is critical that our transportation system supports and encourages walking for short trips.

Figure 4.24 Bike and walk commute rates for metropolitan areas, 2015

Commuters in greater Portland bike and walk to work at rates similar to Boston, San Francisco and New York.

50 largest US metro areas, 2015



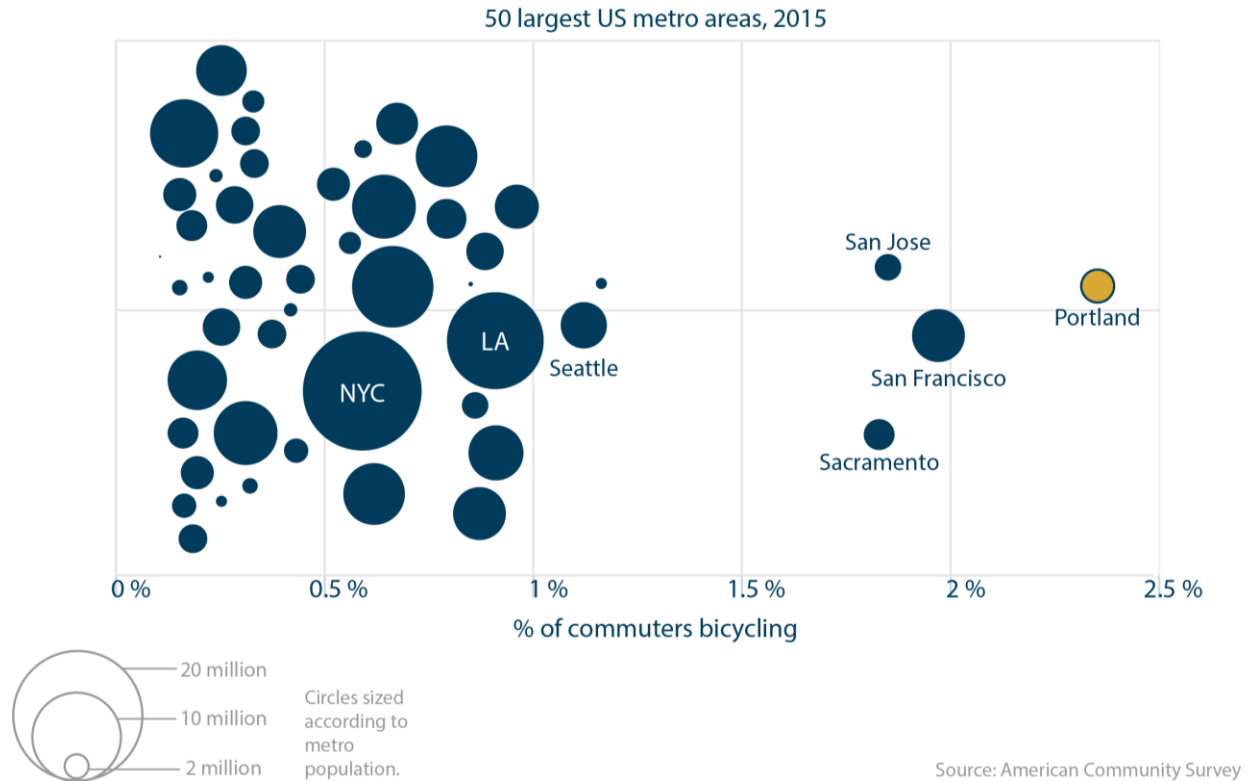
Source: American Community Survey

Bicycling plays an important and growing role in the regional transportation system and the region's economy. Bicycling for transportation grew by 191 percent between 1994 and 2011 adding to the growing demand for improved bicycle facilities.³ Counts taken across five Portland city bridges reported 18,794 daily bicycle trips—a 128 percent increase over the previous 10 years. Increased ridership is due in part to improved bicycle infrastructure as well as increased recognition of the health benefits of bicycling.

³ 2011 Oregon Household Activity Survey, Metro.

Figure 4.25 Bike commute rates for metropolitan areas, 2015

Greater Portland has the highest rate of commuters bicycling to work in the nation.



Transit - MAX Light rail, WES commuter rail, bus, and Portland Streetcar and supporting infrastructure make up the current regional transit system, which has seen increased ridership. In 2014, people in the Portland region took more than 103 million rides on transit. Although ridership has fluctuated over the last 10 years, weekday transit ridership among the region's major transit services – TriMet, SMART (Wilsonville), C-TRAN (Vancouver and Clark County, WA.) and Portland Streetcar – has grown while the average miles each person drives daily has declined.

Figure 4.26 Transit commute rates for metropolitan areas, 2015

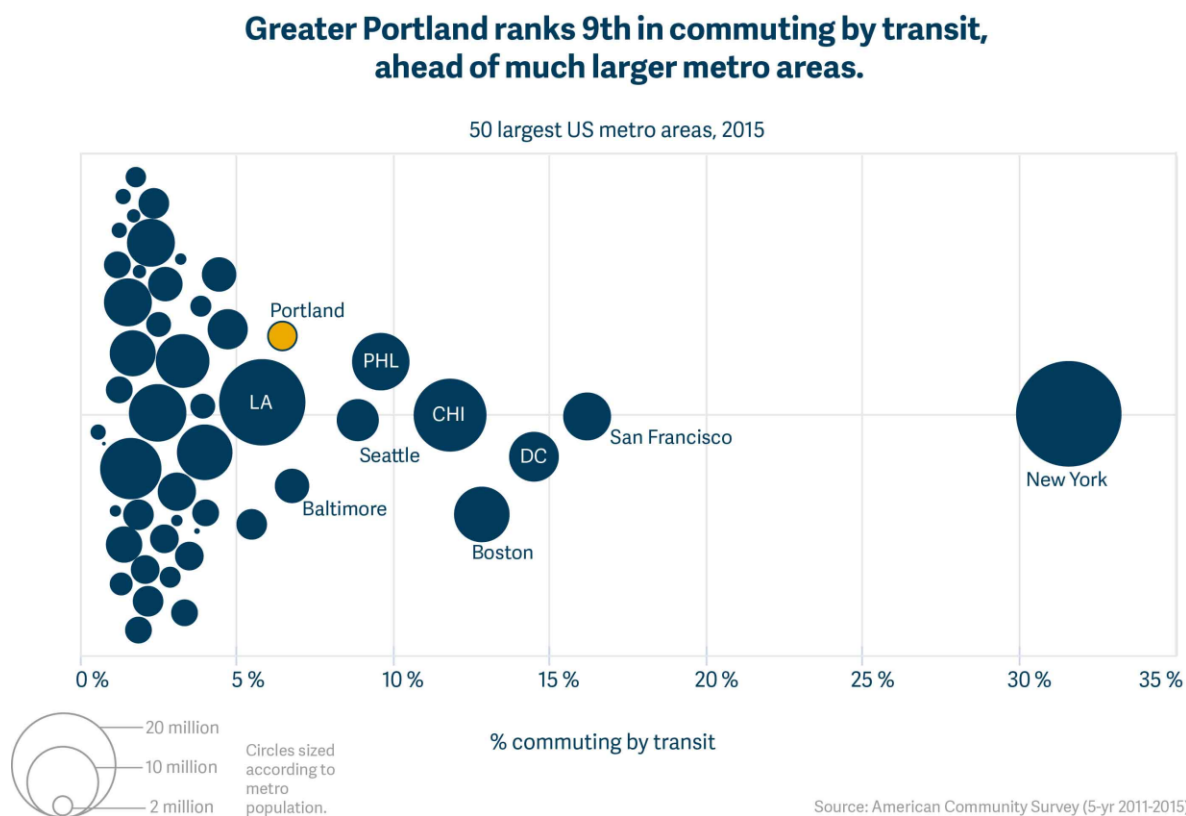


Figure 4.27 TriMet boarding rides per revenue hour compared to other regions, 2015

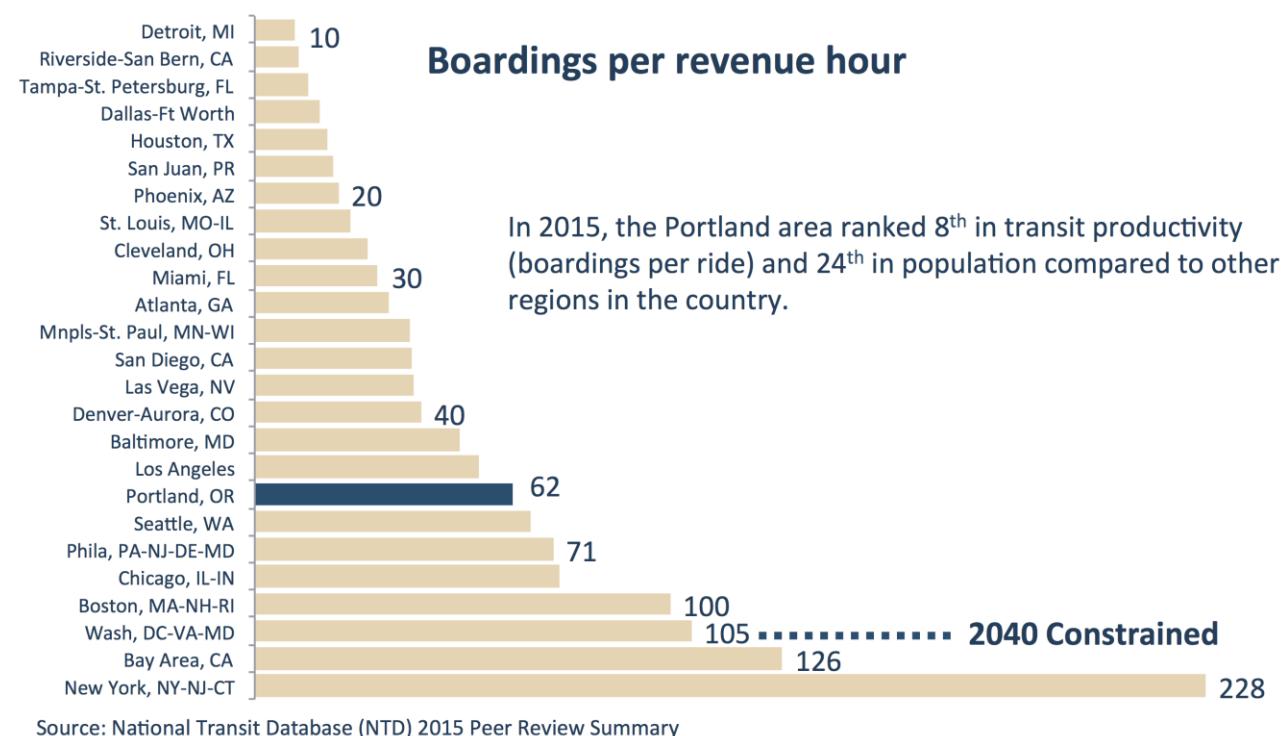
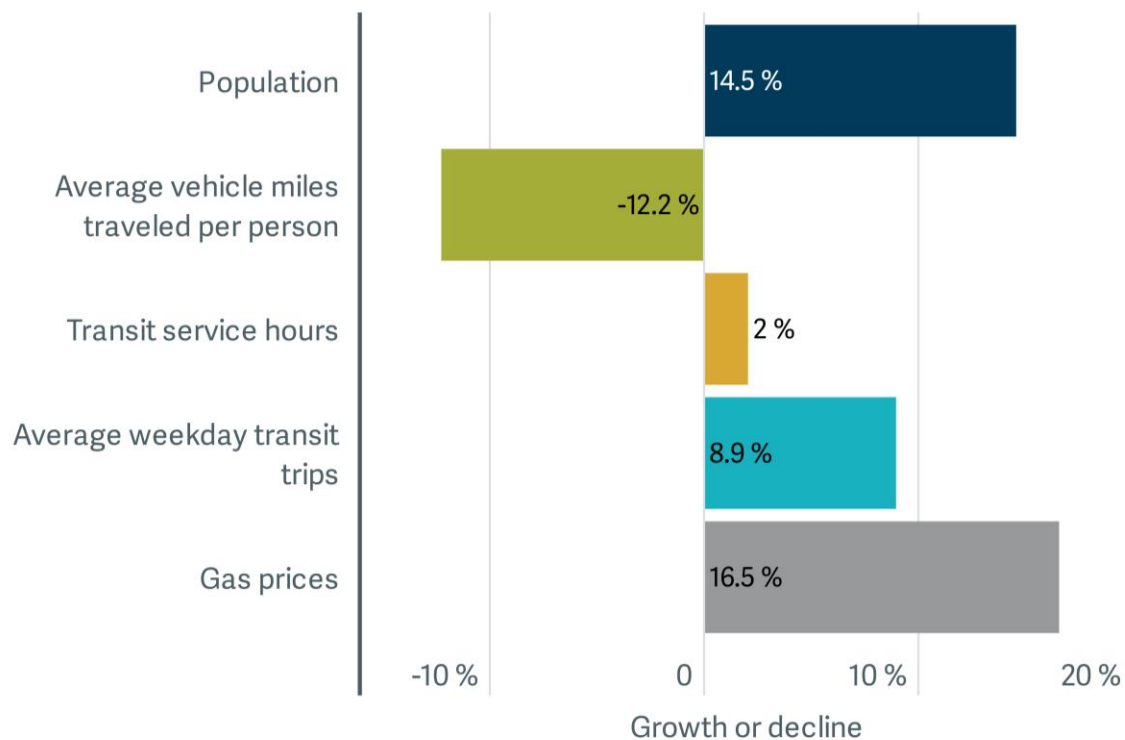


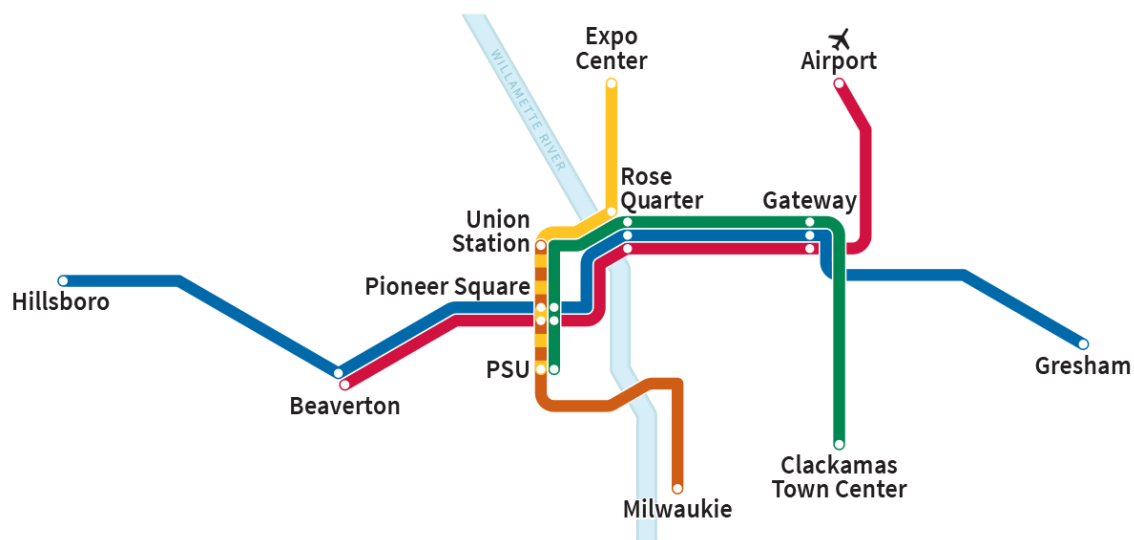
Figure 4.28 Transit ridership compared to other Portland regional trends, 2005-2015



Sources: US Decennial Census, PSU intercensal estimates; Texas A&M Urban Mobility Scorecard; Trimet, Portland Streetcar, Inc., Aerial Tram, and SMART; AAA Fuel Gauge.

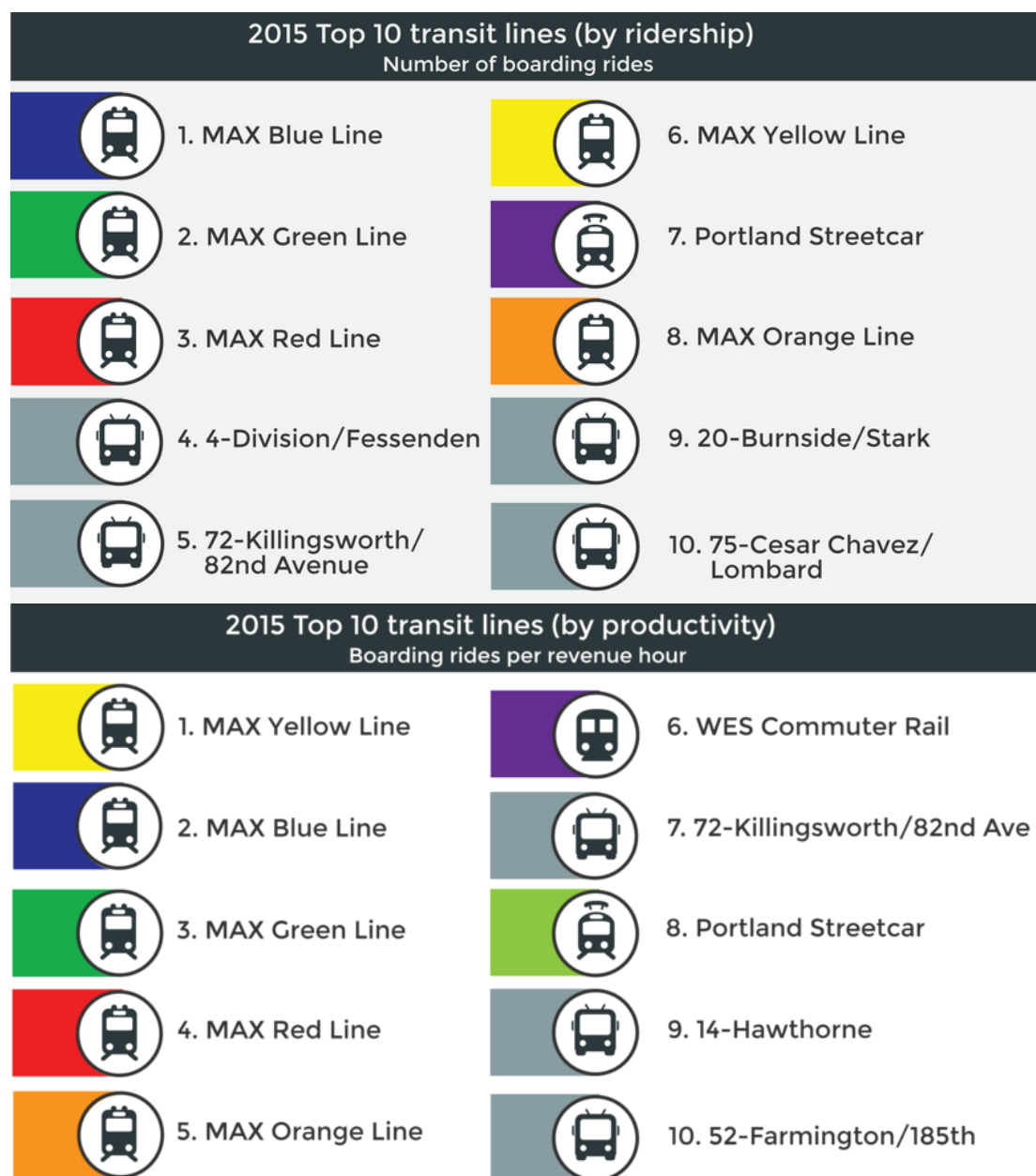
Figure 4.29 shows the MAX system map in 2018.

Figure 4.29 MAX System Map, 2018



As can be seen in **Figure 4.30**, rail transit (light rail, commuter rail and streetcar) carries a big share of the region's transit passengers. For example, although the MAX network only has 88 total track miles compared to the bus network's 822 miles, MAX lines carry almost two-fifths of all transit trips. The Blue MAX line alone carries nearly 60,000 people per day.

Figure 4.30 Top performing transit lines, 2015



Source: TriMet

Effectiveness of employer commuter programs and community and neighborhood programs on changing mode share

Between 1997 and 2006, the TriMet, Wilsonville SMART and transportation management association employer-outreach programs have made significant progress with reducing drive-alone trips. Since 1997, employee commute trips that used non- drive-alone modes (transit, bicycling, walking, carpooling/ vanpooling and telecommuting) rose from 20 percent to over 39 percent among participating employers.

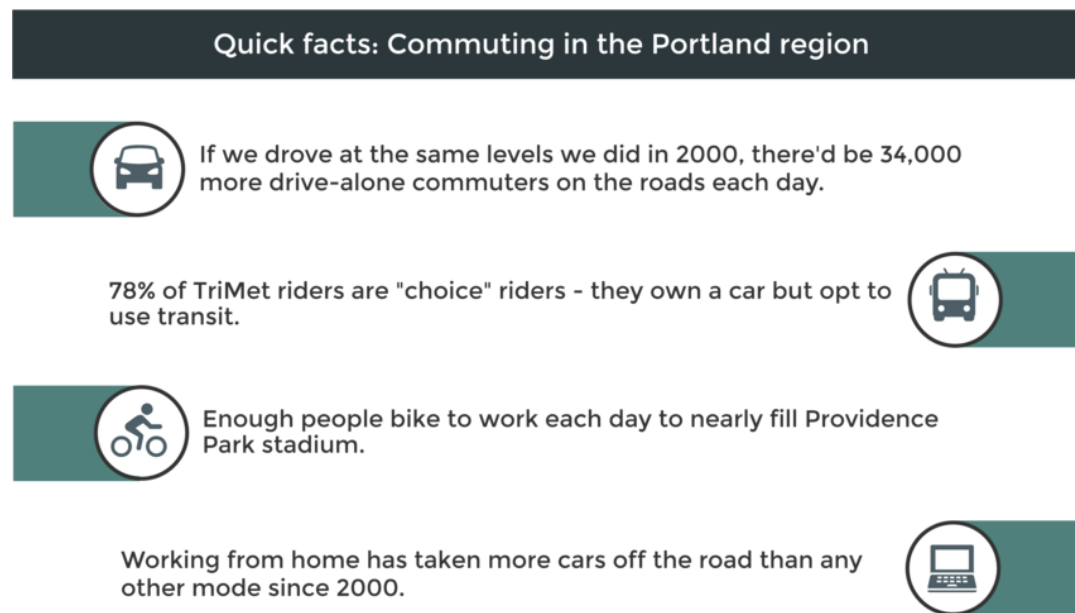
Community outreach programs such as Portland Sunday Parkways and Wilsonville Sunday Streets encourage residents to use travel options by exploring their neighborhoods on foot and bike without competing with motorized traffic. Sunday Parkways events have attracted 119,000 participants, and the Wilsonville Sunday Streets event attracted more than 5,000 participants in 2012.

Other examples of valuable community outreach and educational programs include the Community Cycling Center's program to reduce barriers to biking and Metro's Vámonos program, both of which provide communities across the region with the skills and resources to become more active by walking, biking and using transit for their transportation needs.

In 2004, the City of Portland launched the Interstate TravelSmart individualized marketing project in conjunction with the opening of the MAX Yellow Line. Households that received individualized marketing made nearly twice as many transit trips compared to a similar group of households that did not participate in the marketing campaign. In addition, transit use increased nearly 15 percent during the SmartTrips project along the MAX Green Line in 2010. Follow-up surveys show that household travel behavior is sustained for at least two years after a project has been completed.

In 2015, a unique partnership between Metro, the City of Milwaukie and ODOT engaged residents along the last three stops of the new MAX Orange Line. More than 25 percent of residents participated in the program to learn about new travel options, resulting in a reduction of more than 1.3 million single occupant vehicle miles driven the year after the opening of the line.

Figure 4.31 Quick facts about commuting in the greater Portland region, 2015



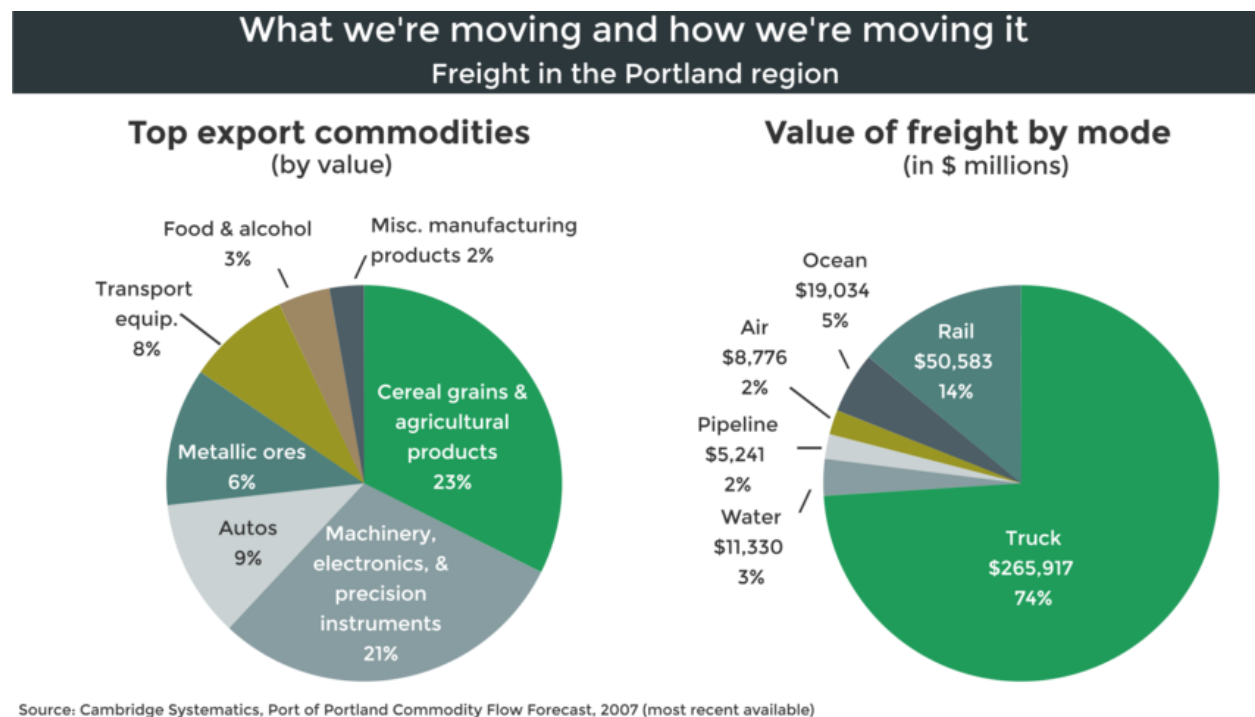
Source: U.S. Census

4.4 HOW WE MOVE GOODS AND SERVICES

Despite a growing “buy local” movement, most of the products we buy come from someplace else and many of the goods we produce in Oregon move on to markets in other states and countries. In comparison with other U.S. metropolitan areas of similar size, Portland’s competitiveness is largely dependent on the region’s goal as a gateway and distribution center for domestic inland and international markets⁴. The global economy is expanding rapidly, and our region’s ability to move products to far-flung markets depends on an efficient transportation system.

With its location on Interstate 5, the West Coast artery of the Interstate Highway System, the greater Portland region is ideally situated to move freight by truck. But with Portland International Airport, two Class 1 railroads (mainline railroads Union Pacific and Burlington Northern/Santa Fe), the southern terminus of the 400-mile Olympic Pipeline, and a location at the confluence of two major rivers with ocean access, the region’s freight transportation system is a multimodal network.

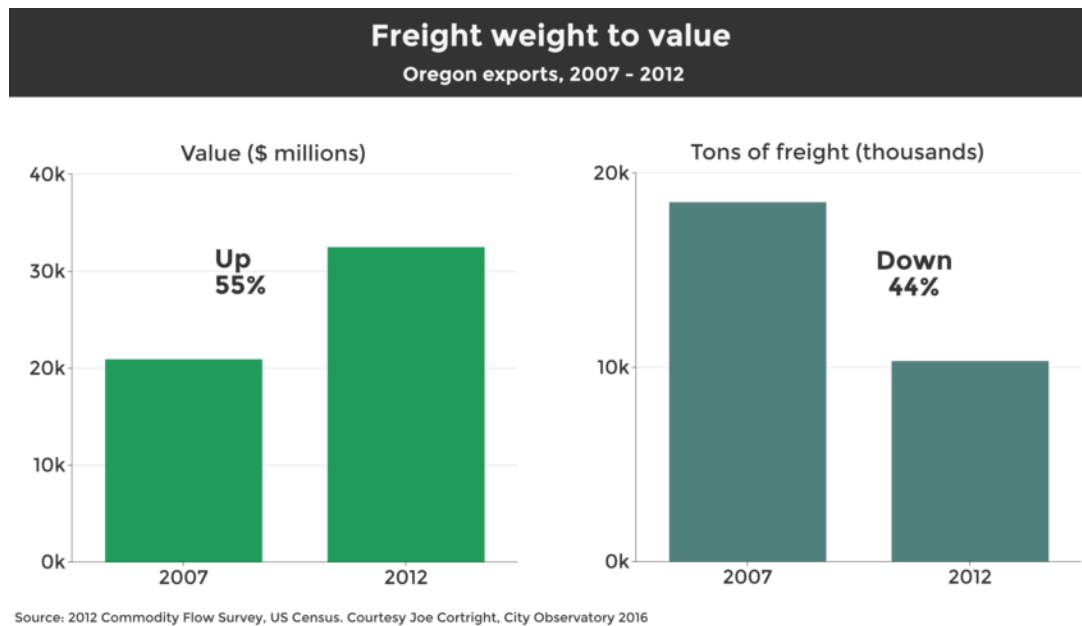
Figure 4.32 Freight goods movement in the greater Portland region, 2012



The majority of the region's freight is still moved by truck as shown in **Figure 4.32**. However, as Oregon’s economy has shifted from bulk products like farm exports and timber to lighter products like semiconductors, electronics and specialized machinery, the region is moving fewer tons of goods around. But these lightweight products are higher-valued – as a result, the overall value of freight exports increased by 55 percent between 2007 and 2012.

⁴ Cost of congestion to the Economy of the Portland Region, November 2015

Figure 4.33 Freight weight to value, 2007-2012



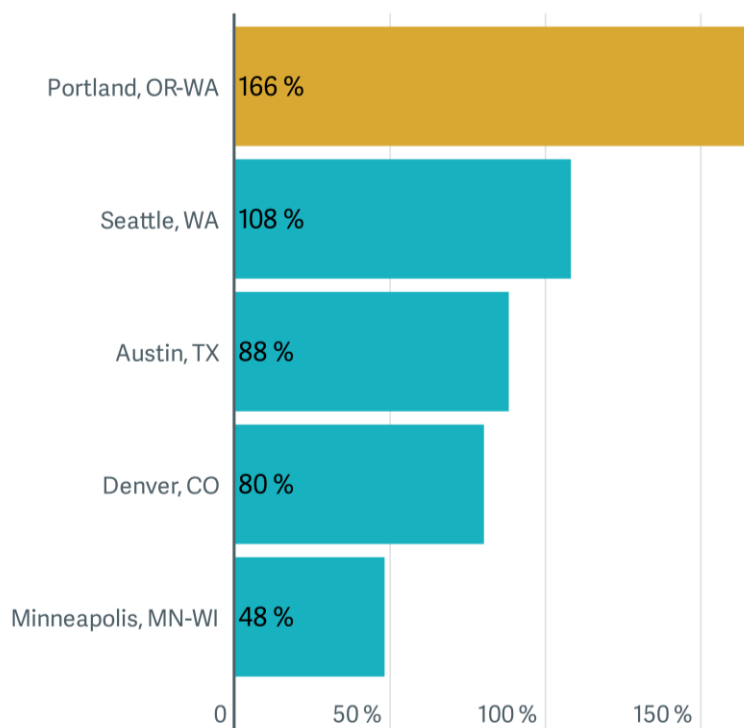
Exports are at the core of the Portland-Vancouver's Metropolitan Statistical Area (MSA) economy. Between 2003 and 2013, the greater Portland region increased its export volume by 166 percent, creating 39,374 direct new jobs for the region. This growth made the greater Portland-Vancouver region the fifth-fastest growing export market among the 100 largest metropolitan areas. In 2013, the region was 13th largest in the U.S. by export volume, with \$26.7 billion in exports.⁵



Semiconductors and computer and electronics equipment are among the top exports from the greater Portland area.

⁵ *Global Trade and Investment Plan – Greater Portland Global, March 2015*

Figure 4.34 Real export growth by metropolitan statistical area, 2003-2013



Source: Export Nation, Brookings Institute, 2014

4.4.1 Competing in a global economy

“Traded sector” industries that bring new money into the region and enable the rest of the economy to prosper require an efficient transportation system. Portland’s economy depends on industries that could locate elsewhere, but have been attracted to the area because of its advantageous trading position. Those industries include semiconductor manufacturers, computer and electronics equipment, wood products, metal products, tourism, publishing, and wholesale distribution activities. Because traded industries depend on the movement of freight, reasonably good transportation access must be maintained if those industries are to remain and grow and in the Portland area in the years to come.

What is the “traded sector”?

As defined in ORS 285A.010, (8), “traded sector” means industries in which member firms sell their goods or services into markets for which national and international competition exists. As a result of their exchange earnings, these industries increase spending power within their region or state.

Traded sector industries are the primary enabler of Portland metropolitan economic growth. The Portland region's traded sector industries are anchored by six core clusters.⁶ These industries are important drivers of regional economic activity today and are well-positioned to spark future growth.

The six core clusters are defined below:

Clean Technology and Green Cities - Manufacturing, energy production, design, and waste disposal industries related to sustainability and resilience.

Computers and Electronics – Establishments that manufacture computers, computer peripherals, communications equipment, and similar electronics products.

Health Sciences and Technology – Advanced medical device manufacturers, plus related research and development establishments; does not include local hospitals.

Metals and Machinery – Broad array of goods-producing establishments working with heavy metals, ranging from foundries to pump makers to ship builders.

Software and Media – Service establishments writing software, planning and managing computer systems, hosting data, and producing and distributing video and sound recordings.

Sporting Equipment, Apparel, and Design – A unique collection of global apparel companies, personal hardware manufacturers, and various design establishments.

The Regional Freight Strategy provides more information, about the trends and challenges facing freight and goods movement in the region.



Skilled welders are a key labor component for manufacturing companies in the region.

⁶ Portland Economic Value Atlas Market Scan (The Brookings Institute) August 2017

4.5 HOW WE KEEP OUR ENVIRONMENT HEALTHY

Choices about how we get around, where we live, and our economy all impact the health of our environment. Metro and the RTP have a role, in partnership with federal, state and local partners in developing and implementing plans and policies that keep our air, water and land healthy for generations to come.

4.5.1 Air quality and climate change

Overall, concentrations of **criteria air pollutants** in the greater Portland region have decreased dramatically over the last 30 years. Through a mix of industrial emissions regulations and transportation emissions reduction strategies, the greater Portland region successfully reduced lead, carbon monoxide and ozone (smog) to meet and maintain federal clean air standards. In October 2017, the region completed the last of its obligations under the Clean Air Act for previous violations of federal air pollution standards.

However, compared to other areas in Oregon, the greater Portland region has the highest risk to the population from **air toxics** due to business and population density. Along with national estimates of air toxics emissions, Portland monitoring studies confirm the presence of air toxics at levels that can cause adverse health effects.⁷ A 2012 Oregon Department of Environmental Quality study identified 14 of the 19 pollutants above health-based benchmarks. Eight of the 14 pollutants cause the most risk. The study found that the entire Portland region experiences diesel pollution at concentrations above the state's health benchmark. The study also found that the ten lowest income and ten highest minority census block groups experience more exposure to all sources of air toxics than the average census block group.

While the study shows that most air toxics are found throughout the study area, higher concentrations are found in densely populated neighborhoods, near busy roads and highways and in areas with business and industrial activity.⁸ Low-income neighborhoods, tribal populations and communities of color that live in urban areas are

Defining terms

Air quality

The degree to which the ambient air is pollution-free, assessed by measuring a number of indicators of pollution.

Criteria air pollutants

Carbon monoxide, lead, ground-level ozone, nitrogen dioxide, particulate matter, and sulfur dioxide. Criteria pollutants are the only air pollutants with national air quality standards that define allowable concentrations of these substances in ambient air.

Air toxics

Also known as toxic air pollutants or hazardous air pollutants, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects.

Greenhouse gases

Greenhouse gases - The six gases identified in the Kyoto Protocol and by the Oregon Greenhouse Gas Mandatory Reporting Advisory Committee as contributing to global warming: carbon dioxide (CO₂), nitrous oxide (N₂), methane (CH₄), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

⁷ Portland Air Toxics Solutions Committee Report and Recommendations, Oregon Department of Environmental Quality, April 2012

⁸ Ibid

disproportionately exposed to air pollution, which is a barrier to economic opportunity and security.

For example, as part of the Portland Air Toxics Solutions Study, DEQ used its modeling estimates to conduct an environmental justice analysis of air toxics impacts. The DEQ analysis demonstrated that disproportionate impacts from air toxics do occur for people of color and low-income populations in the greater Portland region, and that different populations are affected by different types of emission sources. In general, DEQ found that the Hispanic/Latino population experienced the highest impacts from residential wood combustion emissions, the Asian population from car and truck emissions, and the African American/Black population from commercial solvent and fuel use emissions. In addition, DEQ found that the general population (all races) living below the poverty level is disproportionately affected by toxic air pollution from cars and trucks.

In addition, according to the 2011 National Air Toxics Assessment, mobile-source air pollution is the largest contributor to cancer risk from air pollution in Multnomah County. The Oregon Department of Environmental Quality is continuing to work with Metro and other stakeholders to address localized hotspot pollution from light and heavy-duty vehicle emissions in the region.

Metro's Climate Smart Strategy responds to a state mandate to develop and implement a strategy to reduce per capita greenhouse gas emissions from cars and small trucks by 2035. In December 2014, after a four-year collaborative process, the Metro Council and JPACT adopted a Climate Smart Strategy that is expected to achieve a 29 percent reduction in per capita greenhouse gas emissions by 2035, if fully funded and implemented, exceeding the state mandated target.⁹ The strategy does more than just exceed the state mandated target; it also supports job creation and economic development, saves businesses and households money, helps people live healthier lives, protects clean air and water, and makes the most of the investments already made in the region's transportation system.

The strategy relies on adopted local and regional land use and transportation plans and expected advancements in cleaner, low carbon fuels and more fuel-efficient vehicles. The strategy includes nine key policies that are reflected in Chapter 3. Section 4.7.3 describes the anticipated effects of climate change as well as opportunities and challenges ahead.



Healthy people and a healthy environment are goals of the RTP that will guide planning and investment in the region's transportation system.

⁹ Climate Smart Strategy for the Portland metropolitan region, Metro, 2014

4.5.2 Wildlife Habitat and Connectivity

Without appropriate intervention and mitigation, transportation corridors create barriers and hazards in wildlife corridors and fish passageways. Several Metro-initiated activities are aimed at restoring habitat or mitigating the effects of the transportation system on the natural environment.

Development of the [Regional Conservation Strategy](#) for the greater Portland-Vancouver region reflects an ongoing effort to maintain an inventory of regionally significant fish and wildlife habitat and map ecologically sensitive areas for informing potential environmental impacts of transportation projects. The inventory is used in the RTP to identify and flag future transportation projects that overlap with sensitive fish and wildlife habitat in order to avoid, minimize and mitigate the negative impacts of transportation projects on the natural environment.



Metro has initiated several activities aimed at restoring habitat and mitigating the effects of the transportation system on air, water and other natural resources.

It is the goal of the Regional Conservation Strategy to manage the region's resources in a way that:

- Protects the water and air quality of the region
- Provides other important ecosystem services, such as flood control, water storage, and pollination
- Supports—at a minimum—the current level of biodiversity (i.e., the existing range of plants, animals, and wildlife habitats)
- Helps species and habitats recover from historical losses or degradation
- Increases natural systems' resilience and their ability to adapt to an unpredictably changing climate
- Provides opportunities for people to access natural areas for local recreation, research, and appreciation

Figure 4.35 Resource areas considered in RTP environmental analysis

Resource areas included in 2018 RTP environmental analysis

The following list identifies the types of resource areas considered during development of RTP update to identify potential resource impacts:

- Metro Title 13 inventory of regionally significant riparian & upland wildlife habitat, habitats of concern, and impact areas
- Regional Conservation Strategy high value habitat areas (top 25 percent scoring habitat areas)
- ODFW Conservation Opportunity Areas
- ODFW fish passage barriers and fish bearing streams
- NWI Wetlands and Waterways
- FEMA flood hazard areas and floodplains
- National Register of Historic Places historic and cultural resources
- Bureau of Indian Affairs tribal lands
- Air pollutants, including greenhouse gas emissions

See *Appendix F Environmental Assessment and Potential Mitigation Strategies* for more information.

4.5.3 Water Quality

Impervious surfaces have been linked to changes in the shape of streams, water quality, water temperature and the biological health of waterways. About 13 percent of the region is covered by developed land such as pavement and buildings.¹⁰

With respect to runoff quality, recent research by the National Marine Fisheries Service and Washington State University points to the high aquatic toxicity of runoff from roadway surfaces. This toxicity is directly proportional to traffic volumes. Stormwater facilities that are vegetated and contain compost-amended soils represent the only currently effective treatment options to address these often unidentified toxic compounds. Such facilities must be prioritized in current National Pollutant Discharge Elimination System (NPDES) municipal stormwater permits across the region.

With respect to runoff quantity, development in the region at increasing density results in less pervious surface available to absorb the combined runoff volumes from transportation surfaces, structures and associated impervious area. Runoff volumes of winter peak flows can more than double from predevelopment conditions in the face of urban development, with associated flow reductions in summer. Climate change is expected to reinforce this pattern. Higher runoff volumes result in channel erosion, aquatic and floodplain habitat degradation, and damage to

¹⁰ Regional Conservation Strategy for the Greater Portland-Vancouver Region can be found at regionalconservationstrategy.org.

infrastructure, including transportation infrastructure such as bridges and culverts. Low summer flows reduce the vigor of vegetation that helps stabilize stream banks. Yet more than half of the region, including nearly all of the area west of the Willamette River, has subsurface conditions that do not promote easy infiltration of large volumes of urban runoff.

Because water quality is not addressed directly in the Regional Conservation Strategy mapping, protecting water quality upstream of high value ecosystems, rather than just protecting riparian corridors within high value ecosystems is important. Metro's Parks and Natural Areas Program acquires land to protect habitat and water quality and conduct ongoing performance monitoring of habitat and watershed health.

Metro's design guidance for streets and regional trails provides best practices to create livable streets that avoid, minimize and mitigate the negative impacts of transportation on water, air and habitat. The design guidelines were first developed in 2002. The *Creating Livable Streets*, *Green Streets* and *Trees for Green Streets* handbooks are currently being updated to reflect best practices associated with street design to lessen impacts on habitat and ecosystems and will include regional trail design guidance, in addition to the current *Wildlife Crossings* and *Green Trails* handbooks. These handbooks along with the newly updated design guidance will be available on Metro's website for easy access. Additionally, the Regional Active Transportation Plan provides *Top 10 Natural Resource Considerations for Trail Planners*. This set of considerations is provided to local jurisdictions that receive funding from Metro for regional trails and reflect best practices to protect habitat.

Future work by Metro and partners could include an inventory of culverts in the region that need repair or replacement to accommodate endangered or threatened fish species. Refer to **Appendix F** for additional detail on strategies to avoid, minimize and mitigate the negative impacts of transportation projects on the natural environment.



4.6 HOW THE SYSTEM IS WORKING – CHALLENGES AND OPPORTUNITIES AHEAD

The following regional transportation challenges were identified through the engagement process during the update of the RTP. The regional investment strategy in Chapter 6 was developed to address these challenges.

- Inadequate funding
- Aging infrastructure
- Climate change and air quality
- Energy efficiency and conservation
- Congestion and reliability
- Fatal and life-changing crashes
- Earthquake vulnerability, security and emergency management
- Gaps in transit, biking and walking connections
- Social inequity and disparities
- Housing and transportation affordability and displacement
- Technological change

4.6.1 Inadequate funding

Today the federal government is investing less in infrastructure than ever before. While budgets are shrinking, aging roads and bridges are operating beyond capacity, and our transit systems lack funding to expand. Traditional approaches to financing transportation projects are not only failing to maintain existing infrastructure, they are wholly inadequate to build new systems to accommodate growth and keep our economy moving.

Oregon auto taxes and fees are the lowest in the nation according to Bankrate.com's most recent Car Cost index. The index lists the annual costs of car ownership for all 50 states. In 2014, Oregon's annual average cost for car ownership was about 31 percent lower than the national average. The largest difference in vehicle costs was for taxes and fees, which the index estimated to be \$157 a year, about 85 percent lower than the national average of \$1,058.

As of January 2018, Oregon automobile related taxes and fees are the lowest among our neighboring western states as shown in **Table 4.1**. The federal excise gas tax of 18.4 cents per gallon and state/local air emissions fees are excluded from the table. In Oregon, other than the new privilege tax, all motorist taxes and fees are constitutionally dedicated to roads. Other western states place some motorist revenues in their general funds to support non-highway/transit programs, even non-transportation programs. For example, many western states impose both a state sales tax as well as a local option sales tax on automobile purchases. These sales taxes usually generate more revenue than the gas tax on a cents per gallon basis.

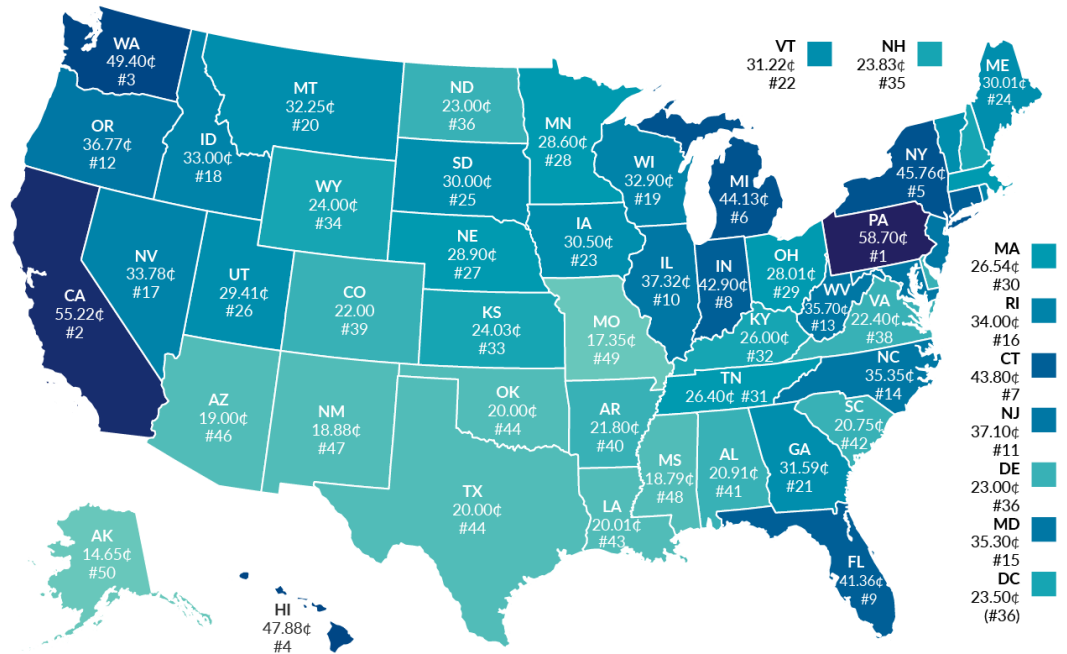
Table 4.1 Comparison of automobile related taxes in western states, 2018

Tax (cents per gallon units)	OR	MT	ID	UT	NV	WA	CA
State gas excise tax	34.1¢	32.3¢	32.0¢	29.4¢	23.0¢	49.4¢	41.7¢
Gas sales & local option taxes	2.5¢	0¢	1.0¢	0¢	10.8¢	0¢	16.6¢
Registration fees	11.8¢	20.0¢	9.3¢	9.5¢	6.8¢	16.8¢	19.6¢
Ad valorem taxes	0¢	4.0¢	0¢	10.0¢	31.2¢	13.1¢	16.2¢
Auto sales taxes	4.0¢	0¢	38.4¢	43.8¢	51.2¢	60.8¢	54.4¢
Title & related fees	3.7¢	0.5¢	0.6¢	0.2¢	1.2¢	2.7¢	0.9¢
Total cents per gallon	56.1¢	56.8¢	81.3¢	92.9¢	124.2¢	142.6¢	149.3¢

Source: Oregon Department of Transportation (January 2018)

Figure 4.36 further illustrates Oregon's relative ranking nationally in July 2018. Pennsylvania's gas tax rate is highest at 58.7 cents per gallon, followed by California (55.22 cpg) and Washington (49.4 cpg). The lowest gas tax rate is found in Alaska at 14.65 cents per gallon, followed by Missouri (17.35 cpg) and Mississippi (18.79). Oregon ranked 12th nationally.

Figure 4.36 Comparison of gasoline taxes and fees in all states, 2018



Notes: These rates do not include the 18.40 cent/gallon federal excise tax on gas. The American Petroleum Institute (API) has developed a methodology for determining the average tax rate on a gallon of fuel. Rates may include any of the following: excise taxes, environmental fees, storage tank taxes, other fees or taxes, and general sales tax. In states where gasoline is subject to the general sales tax, or where the fuel tax is based on the average sale price, the average rate determined by API is sensitive to changes in the price of gasoline. States that fully or partially apply general sales taxes to gasoline are California, Connecticut, Georgia, Illinois, Indiana, Michigan, and New York. D.C.'s rank does not affect states' ranks, but the figure in parentheses indicates where it would rank if included.

Source: American Petroleum Institute.



One of the primary issues with federal and state gas taxes is that they are not indexed for inflation, meaning the nominal value of revenue generated from the gas tax isn't keeping pace with infrastructure funding needs across the country. Indexing gas taxes for inflation is one of the most important actions states can take to create a more stable source of revenue to fund infrastructure maintenance and repair needs for years to come. Over the next two decades, the gap is expected to grow between the revenues we have and the investments we need just to keep our bridges, roads and transit systems in their current condition, to say nothing of addressing new needs. Current sources of transit funding have not been adequate to support needed maintenance and expansion of transit systems to serve growing populations.

4.6.2 Aging infrastructure – maintaining the system we have

The region's aging infrastructure is deteriorating and requires more maintenance than ever before, similar to other cities and regions across the country. In its 2017 Report Card for America's Infrastructure, the American Society of Civil Engineers gave America a D for roads, stating that 21 percent of the nation's roads were in poor in 2015.¹¹ The report also estimated that driving on roads in need of repair cost Oregon motorists \$285 per year in extra vehicle repairs and operating costs.¹²

The Oregon Department of Transportation, cities, and counties devote nearly all existing state and federal gas tax revenues to operation and maintenance of the existing road system. The federal fuel tax stands at 18.4 cents per gallon on gasoline and 24.4 cents per gallon for diesel; however the tax has not been increased since 1993, when gas was consistently under \$1.20 per gallon. If the tax has been indexed to inflation it would be about 30 cents per gallon now.¹³

Comprehensive maintenance data for the region is not currently available. However, with passage of Keep Oregon Moving (HB 2017) the Oregon Legislature made a significant investment in transportation, both statewide and in local communities. With those investments came transparency, accountability and performance requirements. Reporting on the condition of transportation infrastructure and making those reports available to the legislature and public is one of those transparency and accountability measures.

ODOT staff, in coordination with city and county designees, developed a set of uniform condition descriptions and standardized processes for purposes of reporting on the condition of pavement and bridges owned by cities, counties and the state, which were adopted by the Oregon Transportation Commission (OTC) in February 2018. In December 2018, ODOT staff launched a web-based reporting form, allowing local governments to submit condition reports electronically.

Preliminary data was available at the time the 2018 RTP was being finalized and is provided for reference in **Tables 4.2 through 4.5**.

¹¹ American Society of Civil Engineers. [2017 Infrastructure Report Card](#), March 2017.

¹² Ibid.

¹³ Portland City Club. Portland's Streets, End the Funding Gridlock, City Club of Portland Bulletin, Vol. 98, No. 8, September 9, 2015.

Table 4.2 County-owned bridge conditions

National Bridge Inventory

County	Good	Fair	Poor	Total
Clackamas	44	111	5	160
Multnomah	7	26	3	36
Washington	67	68	16	151
Total	118	205	24	347

Source: Oregon Department of Transportation

Table 4.3 County reported pavement conditions

Paved Federal-Aid System Road Miles

County	Good	Fair	Poor	Total
Clackamas	394	102	15	511
Multnomah	66	38	6	110
Washington	329	57	10	396
Total	789	197	31	1017

Source: Oregon Department of Transportation

Table 4.4 City-owned bridge conditions

National Bridge Inventory

City	Good	Fair	Poor	Total
Beaverton	12	6	0	18
Cornelius	1	0	0	1
Gresham	49	17	6	72
Happy Valley	71	1	0	72
Hillsboro	0	2	0	2
Lake Oswego	3	4	0	7
Milwaukie	0	2	1	3
Oregon City	0	2	0	2
Portland	25	95	2	122
Sherwood	1	0	0	1
Tigard	5	5	1	11
Tualatin	3	0	0	3
Wilsonville	3	2	0	5
Total	173	136	10	319

Source: Oregon Department of Transportation

Table 4.5 City reported pavement conditions

Paved Federal-Aid System Road Miles

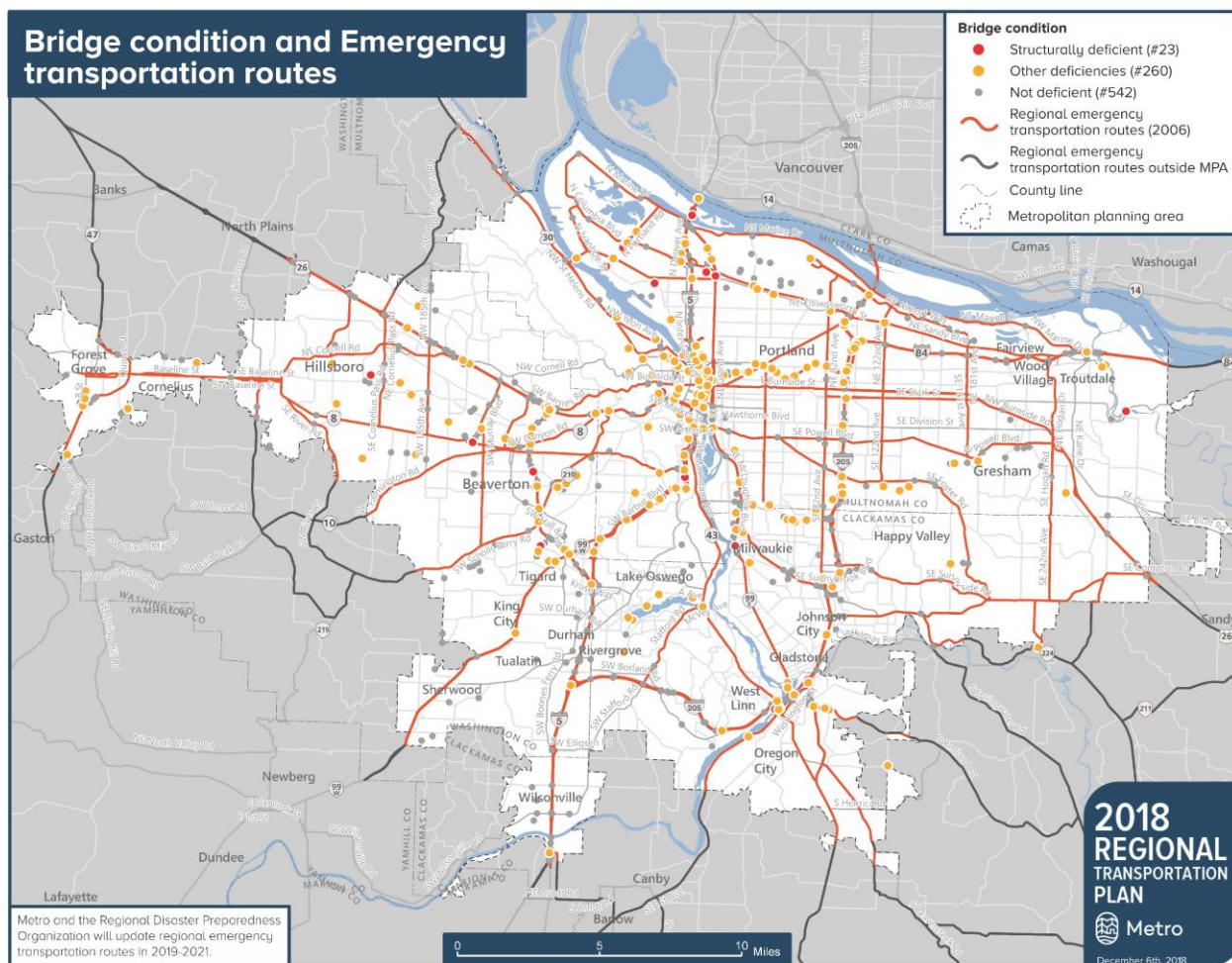
City	Good	Fair	Poor	Total
Beaverton	31	19	4	54
Cornelius	8	3	1	12
Forest Grove	18	4	3	25
Gladstone	4	3	1	8
Gresham	49	17	6	72
Happy Valley	13	1	0	14
Hillsboro	42	11	1	54
King City	0	1	0	1
Lake Oswego	31	5	7	43
Maywood Park	0	0	2	2
Milwaukie	9	3	4	16
Oregon City	27	6	1	34
Portland	174	130	134	438
Sherwood	15	6	0	21
Tigard	19	6	0	25
Troutdale	3	0	0	3
Tualatin	22	1	1	24
West Linn	8	5	4	17
Wilsonville	20	8	2	30
Total	493	229	171	893

Source: Oregon Department of Transportation

The first statewide bridge and pavement condition report will be published by ODOT in 2019, serving as a baseline for comparison and monitoring moving forward. In addition, **Appendix L** to the RTP establishes baseline bridge and pavement condition (and related federal performance targets) for the National Highway System. Metro will continue to coordinate with ODOT to monitor performance measures and targets over time.

An inventory of the region's bridges and the condition rating given to each bridge is shown in **Figure 4.37**.

Figure 4.37 Regional Bridge Condition



4.6.3 Climate change and air quality

Climate change is the defining global challenge of the 21st century. Global climate change poses a growing threat to our environment, public health and our economy, and creates uncertainties for the region.

Documented effects of climate change include: extreme weather events, increase in average annual air temperatures and likelihood of extreme heat events, changes in hydrology, water supply and stream flows, rising sea levels, reduced water quality, changes in wetland ecosystems, increase in breeding grounds for water-borne diseases, shifting rainfall patterns, reduced air quality, increase in wildfire frequency and intensity, increased incidents of landslides, shifts in quality of habitat, shifts in migration patterns and habitat range, and changes to growing seasons such as increased incidents of short-term drought, and the distribution of plants and animals.

Climate change impacts will impact the service life of transportation infrastructure and the more severe storms that are predicted will increase the frequency of flooding and landslides.

Consequent damage to roads, bridges and rail infrastructure will compromise system safety, disrupt mobility and hurt the region's economic competitiveness.

Our ability to respond, not just as the Portland region but as a state, will have unprecedented impact on our lives and our survival. Natural resource protection and enhancement and use of green infrastructure in transportation designs are an part of a holistic approach to climate mitigation and adaptation as described in Section 4.5 and Appendix F. In addition, the region must remain steadfast in its efforts to implement the Climate Smart Strategy and continue to support statewide efforts to reduce greenhouse gas emissions from transportation.

The goal of the region's Climate Smart Strategy is to demonstrate leadership on climate change by meeting adopted targets for reducing greenhouse gas emissions from light-duty vehicles while creating healthy and equitable communities and a strong economy. Adopted by JPACT and the Metro Council in 2014 with broad support, the strategy is built from the land use and transportation plans and visions already adopted by local jurisdictions across the region, creating a diverse and shared vision. It includes making investments to increase active transportation, increase transit and use technology and other strategies to improve safety, reduce traffic delay and make the most of investments we already made in our transportation system.¹⁵

The Oregon Sustainable Transportation Initiative (OSTI) is an integrated statewide effort to reduce greenhouse gas (GHG) emissions from transportation. A component of this initiative is the *Oregon Statewide Transportation Strategy (STS): A 2050 vision for Greenhouse Gas Emissions Reductions*. Adopted by the Oregon Transportation Commission as amendment to the Oregon Transportation Plan in 2018, the STS describes what it would take for the transportation sector to get as close as possible to the 2050 goal of a 75 percent reduction below 1990 levels of greenhouse gas emissions.¹⁶

The STS focuses on prevention and mitigation of climate impacts, not adoption activities. It is neither directive nor regulatory, but identifies promising approaches for further consideration by

Regional climate action



The 2018 Regional Transportation Plan is a key tool for the greater Portland region to implement the region's adopted Climate Smart Strategy and the Oregon Statewide Transportation Strategy for Reducing Greenhouse Gas Emissions.

Appendix J reports on implementation progress since 2014. The analysis found the 2018 RTP makes satisfactory progress towards implementing the Climate Smart Strategy, but more investment, actions and resources are needed to ensure the region achieves mandated greenhouse gas emissions reductions.

¹⁵ Climate Smart Strategy for the Portland metropolitan region, Metro, 2014

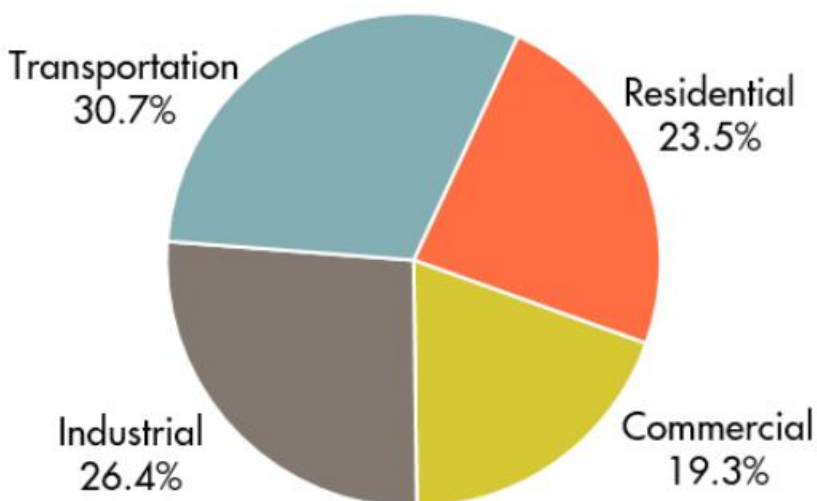
¹⁶ Oregon Statewide Transportation Strategy: A 2050 Vision for Greenhouse Gas Emissions Reduction, Volume 1, Oregon Department of Transportation, March 20 2013

policymakers at the national, state, regional, and local levels without assigning responsibility for implementation. The path forward for the greater Portland region and Oregon will continue to evolve as more planning and analysis work is completed, including monitoring implementation and emissions over time.

4.6.4 Energy efficiency and conservation

Operating vehicles, and building and maintaining roadways, railways, and other transportation corridors, requires significant energy resources. Energy efficiency in the transportation sector merits special attention from the standpoint of energy security and the environment because this sector is almost solely dependent on a single fuel—petroleum—about 98 percent of those fuels are imported into Oregon. Moreover, in 2016, the transportation sector was responsible for about 39 percent Oregon’s emissions of greenhouse gases and about 31 percent of Oregon’s energy use (representing the largest use of energy in Oregon). ¹⁷

Figure 4.38 Oregon Energy Consumption by Sector, 2016



Source: Oregon Department of Energy, [2018 Biennial Energy Report](#), Nov. 2018.

While per vehicle fuel consumption and GHG emissions have declined because of improved fuel efficiency and increased adoption of alternative fuels, overall transportation sector fuel consumption, GHG emissions, and vehicle miles travelled (VMT) are rising in Oregon, mainly due to population growth and a growing economy. This makes increased support for walking, biking, transit and other shared travel options, and adoption of electric vehicles necessary to conserve transportation fuels and reduce GHG emissions from the transportation sector.

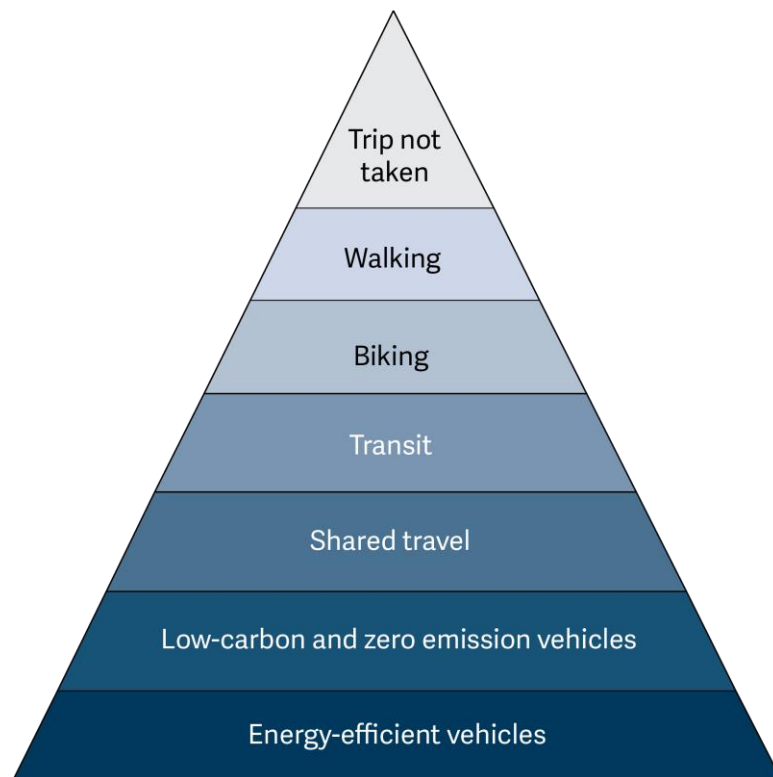
The urgency of addressing climate change and the changing electric grid require a “next level of energy efficiency” to reduce greenhouse gas emissions and reduce the need for new energy supply and associated infrastructure. Transportation electrification will present challenges to this in

¹⁷ Oregon Department of Energy. [2018 Biennial Energy Report](#). November 2018.

terms of investing in the essential charging infrastructure, and determining how the grid will handle the additional load required to serve this new demand. It will be important that the region invest in solutions that promote greater equity, especially for people historically least served or most impacted by fossil fuel-based transportation systems.

The RTP is required to address energy conservation, efficiency, and transportation options under state and federal law. The region has the ability to significantly affect energy efficiency and conservation efforts through developing efficient land use and transportation plans that reduce automobile trips, vehicle miles traveled and dependency on petroleum-based fuels. Strategies include expanding low-energy travel options and use of transportation system management and operations strategies, programs to promote driving less, buying fuel-efficient vehicles, or using alternative fuels.

Figure 4.39 Energy use by mode



Source: Metro

4.6.5 Congestion and reliability

Congestion has many causes, but mostly results from too much traffic for the physical capacity of a road to handle (bottlenecks) or periodic events like crashes, vehicle breakdowns, road work, storms and special events (parades, major sporting events) as shown in **Figure 4.40**. For drivers, this is usually described as routine congestion, which typically occurs daily, versus traffic incidents that are unexpected and difficult to predict.

Drivers can usually plan their day around routine congestion and the typical bottlenecks. Much of the throughway system (our major highways and freeways) is routinely congested during the morning and evening rush hour, and drivers know their trip will be slower during this period. But the traffic incidents and other non-routine events are difficult to plan for, and make it more difficult for drivers to plan commutes or for businesses to plan shipments.

Focusing on system reliability

For this reason, efforts to address congestion in our growing region have started to focus on improving reliability, or the degree to which congestion in a given travel corridor is affected by these non-routine events. Reliability is about predictability and dependability – and being able to count on knowing about how long it will take to get to school, work or activities. Improving reliability means that travelers don't have to budget as much extra time in order to arrive on time at their destinations, even when routine congestion exists on our major throughways.

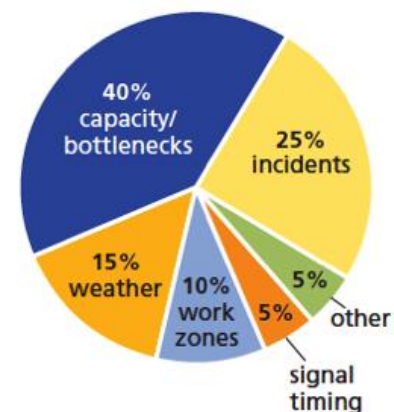
ODOT report shows growth in congestion

ODOT's *2016 Traffic Performance Report* shows what many of us have experienced: traffic congestion in the greater Portland region today can occur at any time of the day or week, and is no longer only a weekday peak hour problem. In 2013, about 11 percent of all travel in the greater Portland region occurred during congested periods. This increased to nearly 14 percent in 2015. This increase in congestion is a reflection of the both the region's continued growth, including our substantial economic rebound from the Great Recession that began in 2008.

Data from the ODOT report for the region's six major throughways (Interstate 5, Interstate 84, Interstate 205, Interstate 405, U.S. 26 and OR 217) shows increasing congestion, decreasing travel speeds, greater delays and unreliable trip times on these major travel routes.

Figure 4.41 shows the top recurring bottlenecks in the region and the change in hours of congestion between 2013 and 2015.

Figure 4.40 Causes of congestion in the greater Portland region




























Source: FHWA

More than half of all congestion is caused by crashes, breakdowns and other causes that can be addressed using system management and operational strategies.

Figure 4.41 Top recurring throughway bottlenecks in the region, 2013 - 2015

These are the most severe recurring bottlenecks for each corridor

Source: FHWA NPMRDS

Bottleneck location	2013	2015	Change
I-5 NB I-5 Interstate Bridge ▶ Capitol Hwy 11.5 Miles	 1:30-7:30 PM 6.0 hrs	 1:30-7:30 PM 6.0 hrs	--
I-5 SB Rose Quarter ▶ Rosa Parks Way 3.0 Miles	 7:45-9:30 AM 1.75 hrs  12:30-6:00 PM 5.5 hrs	 7:45-9:45 AM 2.0 hrs  11:00 AM-6:15 PM 7.25 hrs	+2.0 hrs
I-84 EB I-205 ▶ I-5 6.0 Miles	 1:00 PM-7:00 PM 6.0 hrs	 12:30-7:00 PM 6.5 hrs	+0.5 hrs
I-205 NB Abernethy Bridge ▶ I-5 8.5 Miles	— —	 3:15-6:15 PM 3.0 hrs	+3.0 hrs
I-205 NB Glenn Jackson Bridge ▶ Powell 5.8 Miles	 3:30-6:30 PM 3.0 hrs	 2:45-6:30 PM 3.75 hrs	+0.75 hrs
I-205 SB Division ▶ Glenn Jackson Bridge 5.3 Miles	 2:30-6:00 PM 3.5 hrs	 2:30-6:00 PM 3.5 hrs	--
I-405 SB I-5 ▶ Fremont Brg. 3.5 Miles	 2:30-6:15 PM 3.75 hrs	 2:15-6:15 PM 4.0 hrs	+0.25 hrs
US 26 EB Vista Ridge Tunnel ▶ OR 217 4.9 Miles	 7:00-9:15 AM 2.25 hrs  12:00 PM-7:00 PM 7.0 hrs	 6:15-11:59 AM 5.75 hrs  12:00 PM-7:45 PM 7.75 hrs	+4.25 hours
OR 217 SB Hall Blvd ▶ US 26 3.5 Miles	 1:00-6:15 PM 5.25 hrs	 12:00-6:15 PM 6.25 hrs	+1 hour
OR 217 NB Denney Rd ▶ I-5 3.5 Miles	 7:15-9:00 AM 1.75 hrs  3:00-6:30 PM 3.5 hrs	 7:15-9:00 AM 1.75 hrs  3:00-6:30 PM 3.5 hrs	-- --

Source: FHWA National Performance Management Research Data Set and ODOT

The ODOT report also found that crashes on our throughways are increasing at a rate equal to the increase in congestion, but shows that recent ODOT investments in traveler information signage and adding auxiliary lanes have slowed the rate of crashes at specific bottleneck locations. While not a long-term solution for growing congestion, an auxiliary lane adds capacity in the form of a dedicated lane from an on-ramp to the next off-ramp, helping to reduce crashes caused by drivers merging and weaving between exits.

Congestion on these routes also affects freight in the region, as most of our local goods move by truck today, a trend that is expected in future. With congestion beginning to spread beyond commute periods and into the off-peak in the middle of the day, the ability to move freight during this relatively congestion-free period is being impacted. As the mid-day becomes more unreliable, freight in our region is having more problems meeting delivery schedules, and the cost of shipping is increasing. These shipping costs are typically passed on to businesses and consumers, and could impact the region's competitiveness in the global economy.

Congestion is also affecting the speed and reliability of transit throughout the region

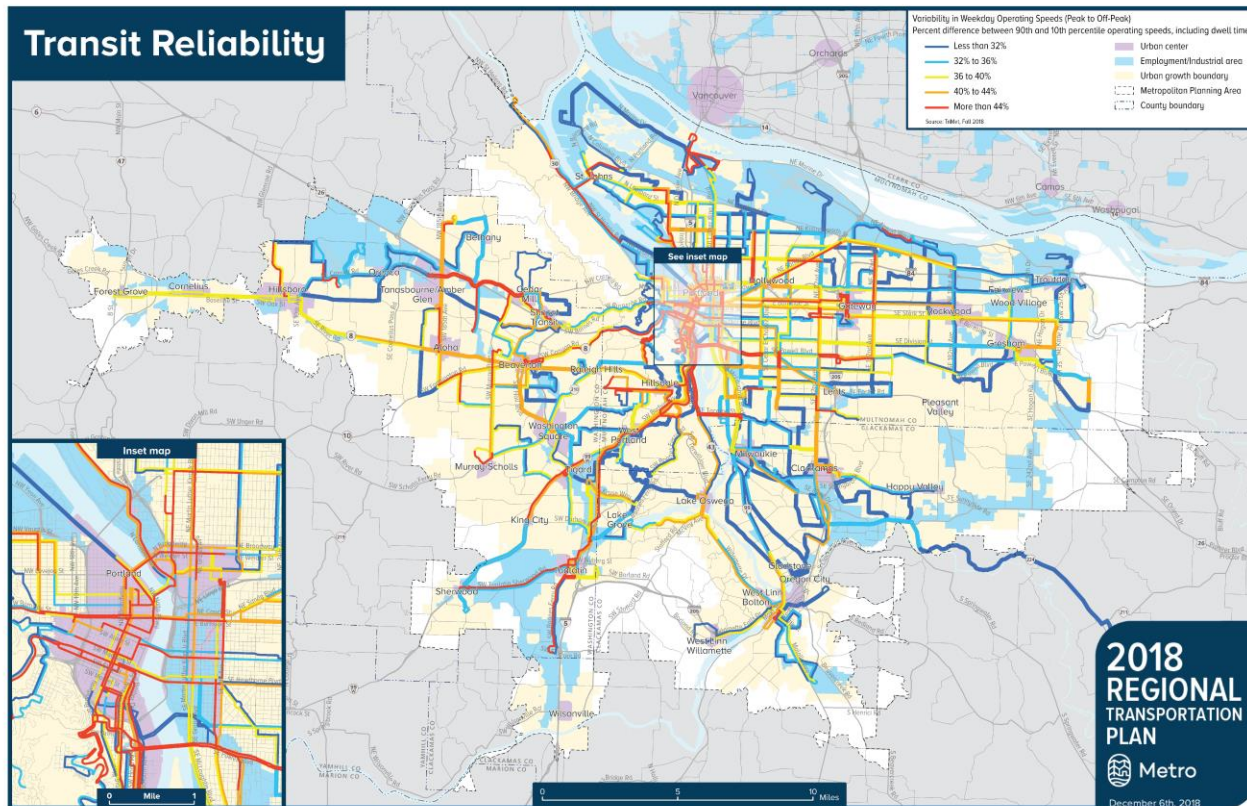
Buses and streetcars are increasingly stuck in traffic, leading to slower average travel speeds, longer travel times and less travel time reliability. Delay to transit is most pronounced during the peak congested times when more vehicles are on the roads. All of this makes bus and streetcar transit less competitive with driving.

Figure 4.42 indicates where buses, and all the people on the bus, experience the most delay during the peak congested time of the day. This map displays bus travel speed variability over the course of the day and helps identify the influence of traffic congestion on delaying transit during typical peak periods. The greater the percentage is, the longer it takes the bus to travel the route segment during peak congested periods versus more free flow traffic conditions. A higher value indicates a higher level of variability and thus a higher delay. The time point segments colored red are where there is the greatest variability and delay to buses.

As of 2018, TriMet spends roughly \$1-2 million per year to add more buses to routes just to keep up with published route schedules and account for greater variability and longer travel times to complete a route.¹⁸ Without substantial improvements to the bus and streetcar network, it is very likely that transit service speed and reliability will continue to deteriorate. The Enhanced Transit Corridors (ETC) concept and toolbox of actions identified in Chapter 3 and the 2018 Regional Transit Strategy is a significant first step toward implementing lower cost, flexible, and effective transit priority treatments that will in turn support more transit ridership throughout the greater Portland region.

¹⁸ City of Portland Enhanced Transit Corridors Plan (June 2018)

Figure 4.42 Transit reliability in the greater Portland region, 2018



Source: TriMet

Oregon Legislature commits to addressing congestion in the greater Portland region

In 2017, the Oregon Legislature approved HB 2017 (discussed in the next section), which provides funding for additional targeted safety and congestion projects that can help address the issues found in the ODOT report. The Legislature also directed the Oregon Transportation Commission (OTC) to develop a proposal for value pricing on I-5 and I-205 from the Columbia River to the junction of the two freeways in the southern part of the region, with the stated purpose of reducing congestion. The OTC must seek approval from the Federal Highway Administration to implement value pricing no later than December 31, 2018. If FHWA approves, the commission is required to implement value pricing. An ODOT-led study is underway to meet this deadline.

According to rankings released in March 2016 by INRIX, a transportation tracking company, the Portland region's major congestion hotspots are those highways leading to and from downtown Portland, the southern tier highways as well as the two interstate connections to Washington, as seen below.

Figure 4.43 Throughway bottlenecks in the greater Portland region, 2017

Bottlenecks

2017

Source: HERE data



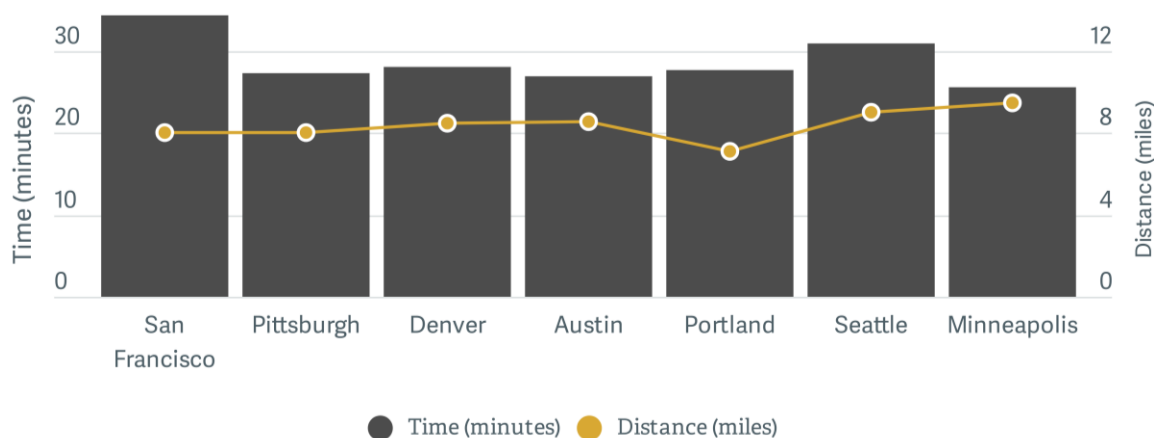
Source: Oregon Department of Transportation, Portland Region 2018 Traffic Performance Report, December 2018.

In 2014, Texas A&M's annual Urban Mobility Scorecard showed the Portland area tied with Austin, Miami, Detroit and Atlanta for 12th place out of 101 regions in yearly delay per auto commuter. The delay per auto commuter is reported as 52 hours per year – exactly the average amount of delay for all 101 cities in the study. The cost of our region's congestion to truck freight was ranked at 16th out of 101 regions, with an estimated annual cost of \$375 million.¹⁹

¹⁹ Texas A&M Transportation Institute 2015 Urban Mobility Scorecard, 2015

Despite such delays, we spend less time commuting to work than people in most other regions. In 2014 the average commute was 26 minutes – about a minute longer than in 2010²⁰. The Portland region is tied for fifth-best metro area in the nation for the share of people with a 30-minute commute or better – nearly two-thirds of commuters in the region have a commute under a half-hour. In part that’s because people here don’t have to travel as far to get to work. The average commute distance in the region is just 7.1 miles.

Figure 4.44 Average commute distance and time for metropolitan areas, 2010-2015



Data: US Decennial Census and 2015 ACS 5-year estimates.

Metro maintains the Congestion Management Process (CMP) for the Portland metropolitan region as required by federal law. The CMP includes a performance management system that informs needed capital investments, such as new or improved transit and road capacity as well as demand and system management strategies to improve performance of the existing infrastructure. The Regional Transportation Plan calls for increasing street network connectivity, expanding travel options, and using system and demand management strategies prior to strategic widening of existing roads and throughways to help improve reliability and better connect goods to market and support travel across the region. The CMP is described more in Chapter 8 and Appendix L.

²⁰ 2014 American Community Survey 1-Year Estimates, Means of Transportation to Work by Selected Characteristics

4.6.6 Fatal and life-changing crashes

Traffic safety affects the greater Portland region on multiple levels. Crashes cause personal tragedy, lost productivity, rising insurance costs, congestion and delay to the movement of people and goods. In addition, safety concerns may prevent people from choosing to walk or bike rather than driving a car. Increasing awareness of safety issues is a first step to improving safety in the region. Efforts to improve transportation safety generally center on preventing traffic crashes that result in severe injury or death.

Traffic related deaths and severe injuries are a critical and preventable public health and social equity issue in the greater Portland region. Between 2011 and 2015, there were more than 116,000 traffic crashes resulting in 311 deaths and 2,102 people severely injured.²¹

Figure 4.45 provides a map showing the location of fatal and life-changing injuries in the greater Portland region between 2011 and 2015.

Traffic crashes are the leading cause of unintentional injury death for young people ages 5 to 24 in Multnomah, Washington and Clackamas County, and the second leading cause of unintentional injury death for people ages 25 to 84.²² On average, 62 people die each year on the region's roadways and 420 people experience a life changing injury. Nearly two people are either killed or severely injured every day in our region in a traffic crash; every 10 days a person riding a bike is killed or severely injured; every 5 days a person walking is killed or severely injured.

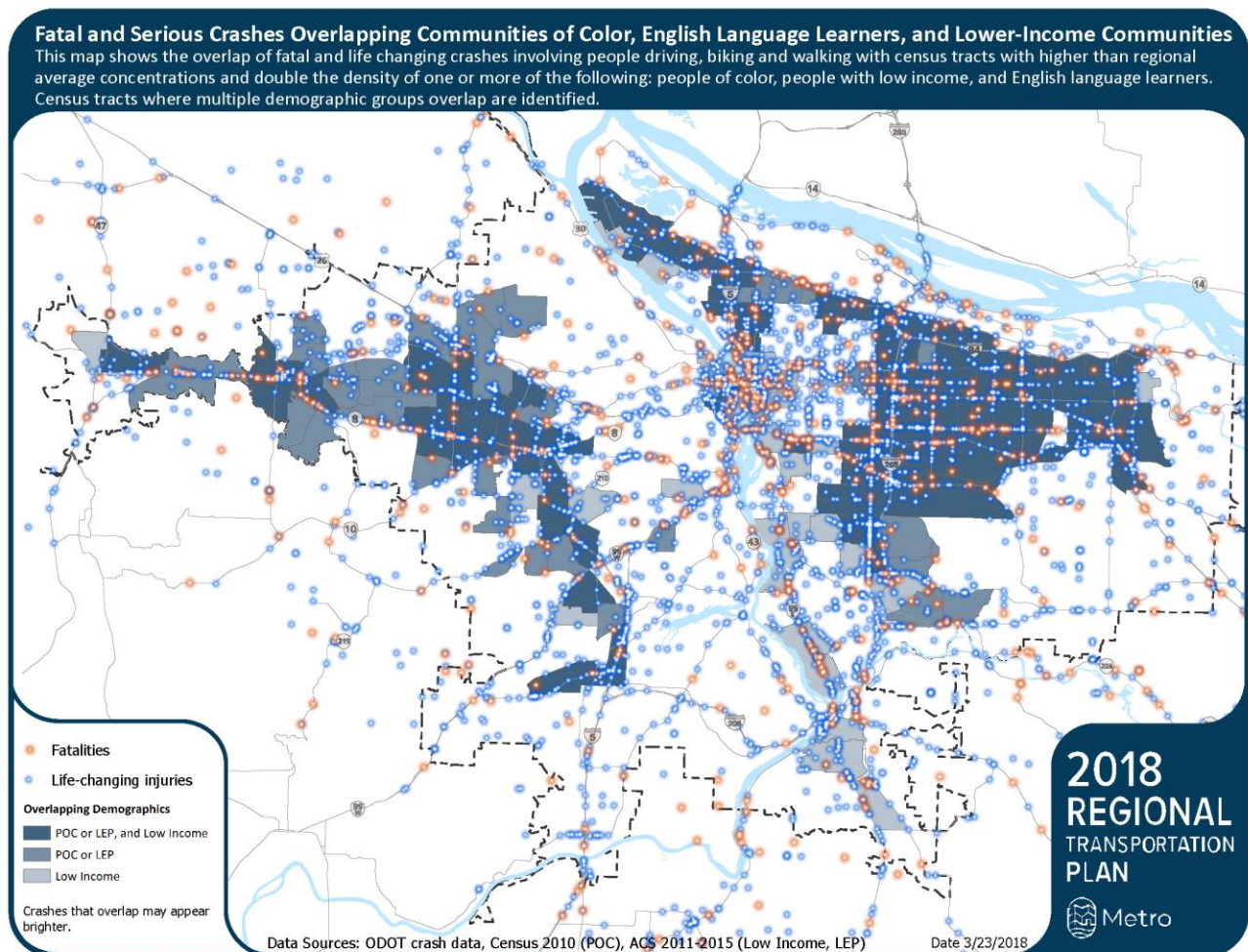


Transportation facilities need to be designed to ensure safe and convenient access for people of all ages and abilities.

²¹ Metro State of Safety Report (January 2018).

²² Oregon Death Certificates: Center for Health Statistics, Center for Public Health Practice, Public Health Division, Oregon Health Authority. Accessed March 13, 2018. For 2012-2016, unintentional injuries were the 4th leading cause of death (just about tied for third with cerebrovascular disease/stroke); within the category of unintentional injury deaths, transport injuries are the third leading cause behind falls and poisoning (poisoning includes drug overdoses).

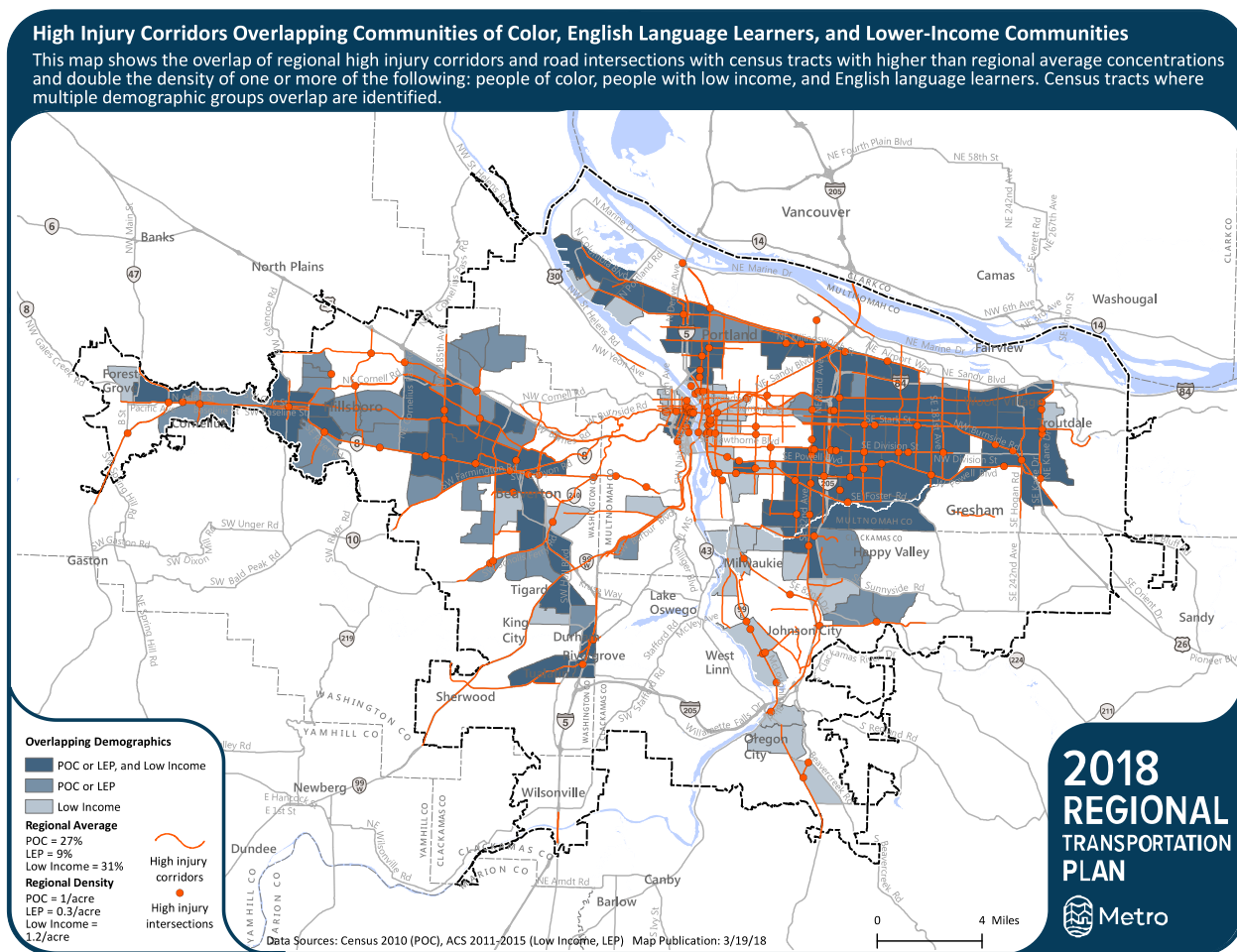
Figure 4.45 Fatal and life changing injuries in the greater Portland region, 2011-2015



Sixty percent of these fatal and severe injury crashes occur on just 6 percent of the region’s major streets. These roadways are identified in **Figure 4.46** as Regional High Injury Corridors and Intersections. The Regional High Injury Corridors and Intersections were identified through an analysis of ODOT’s crash data for the period from 2011 to 2015.

The high injury corridors and intersections are major travel routes with higher occurrences of fatal and severe injury crashes across all modes of travel. They are also where we tend to travel the most, where we run to catch the bus, cross the street to get to schools and shops, ride our bikes or drive. Furthermore, a majority of the high injury corridors and intersections – and a majority of pedestrian deaths and severe injuries occurred in RTP equity focus areas – areas with higher concentrations of people of color, people with low incomes and English language learners as shown in **Figure 4.46**.

Figure 4.46 High injury corridors and intersections in the greater Portland region, 2011-2015



Analysis in the [Metro State of Safety Report](#) (2018) and the [Regional Transportation Safety Strategy](#) (2018) identified the top three challenges that the region faces in eliminating fatal and life-changing injuries:

- 1. Traffic deaths are increasing and are disproportionately impacting people of color, people with low incomes and people over age 65.**
 - Serious crashes (fatal and severe injury crashes combined) have fluctuated since 2007, but more recently have been increasing. Initial data from 2016, 2017 and 2018 indicate that the trend is continuing. This is a trend that is also happening at the state and national levels.
 - The regional annual fatality rate by population and vehicle miles traveled (for 2011-2015) has increased compared to the 2012 Metro State of Safety Report.²³

²³ Fatality rates for traffic related crashes are the proportion of all crashes, person deaths or severe injuries for every 1 million people or every 100 million vehicle miles traveled.

- Your risk of dying in a motor-vehicle involved crash is higher if you are a person of color, are over 65 or have a lower income.²⁴
- A majority of Regional High Injury Corridors are in communities with higher densities of people of color, people with low incomes and English language learners.²⁵
- A majority of pedestrian deaths are in communities with higher densities of people of color, people with low incomes and English language learners.
- Older drivers are twice as likely to die in a traffic crash. For male drivers age 70 to 79 and female drivers age 75 to 85 and older the share of serious crashes is double that of drivers in other age groups.
- In Oregon, American Indians/Alaska Natives have the highest average rate of vehicle related deaths (5.9 per 100,000) 1.8 times the rate among Whites (3.3 per 100,000), and American Indians/Alaska Natives and Black or African American had the highest hospitalization rate – 52.2 and 46.2 per 100,000, compared to 45.5 for Whites and 20.8 for Asian Pacific Islanders for traffic related injuries.²⁶ This data is not currently available at the regional level.

2. Traffic deaths are disproportionately impacting people who are walking.

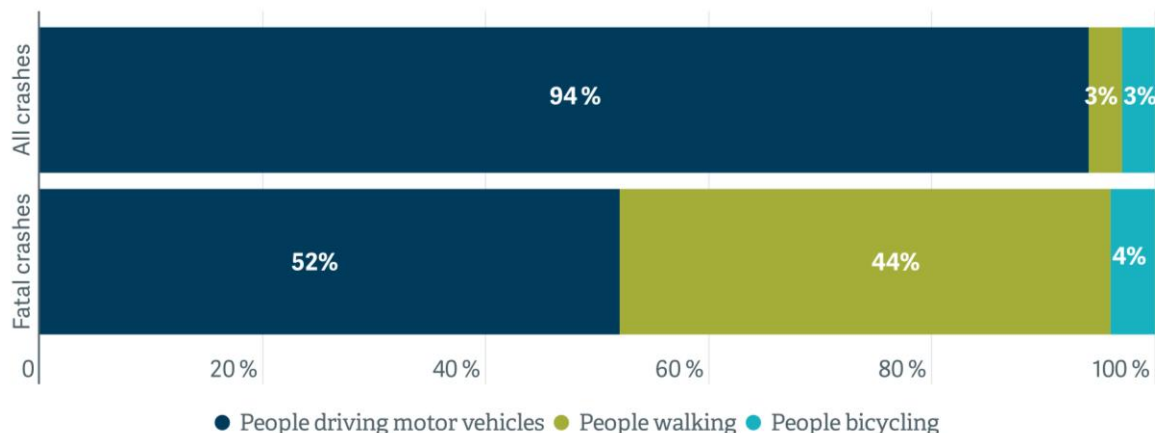
- Auto-only crashes comprise ninety-one percent of all crashes, and thirty-eight percent of all fatal crashes. Pedestrian crashes make up two percent of all crashes, and thirty-six percent of all fatal crashes.
- Pedestrian traffic deaths are steadily increasing, are the most common type of fatal crash, and have the highest severity of any crash type.
- Pedestrian fatalities have steadily increased to 2015 at the local, regional, state and national levels.
- In the region, a pedestrian crash is more than 26 times as likely to be fatal than a crash not involving a pedestrian, and more than 110 times as likely to be fatal as a rear end crash, the most common crash type.
- Roadway design is critical to pedestrian safety. Seventy-seven percent of serious pedestrian crashes occur on arterial roadways in the region. This pattern is seen at the state level as well.

²⁴*Motor Vehicle Traffic-Related Pedestrian Deaths — United States, 2001–2010*, Centers for Disease Control and Prevention (2013); *Dangerous by Design*, National Complete Streets Coalition (2016); *Income Disparities in Street features that Encourage Walking*, Bridging the Gap (2012); *Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods*, Governing, August 2014; *America's Poorer Neighborhoods Plagued by Pedestrian Deaths*, Governing Research Report (August 2014)

²⁵ Figure 4.41 shows the overlap of Regional High Injury Corridors and census tracts with both higher than regional average concentration and double the regional density of people of color, people with low income, and/or English language learners.

²⁶ Oregon Public Health Authority, 2008-2014 crashes

Figure 4.47 All crashes and fatal crashes by mode, 2010-2014



Source: ODOT crash data, 2014

3. A majority of traffic deaths are occurring on a subset of arterial roadways.

- Arterial roadways are the location of the majority of the serious crashes in the region. Sixty-six percent of all serious crashes occur on a roadway designated as an arterial.
- In the region, seventy-three percent of non-freeway serious crashes occur on a roadway designated as an arterial; seventy-seven percent of serious pedestrian crashes occur on a roadway designated as an arterial; sixty-five percent of serious bicycle crashes occur on a roadway designated as an arterial.
- A majority of Regional High Injury Corridors are arterial roadways.
- A majority of the High Injury Corridors and Intersections – and a majority of pedestrian deaths and severe injuries – are in areas with race and income marginalized communities.

Several factors influence the number and severity of injuries from crashes, but some factors stand out from the rest. User behavior is a contributing factor in nearly every crash, from alcohol or drugs to excessive speed and aggressive driving. Driver inattention also plays a major role, although it is difficult to accurately measure its impact. And even as technology has made driving much safer in many respects, it has introduced new challenges. Distracted driving has increased in step with the proliferation of cell phones in society, introducing a relatively new hazard onto the roadways. A 2016 study by the Oregon Department of Transportation shows that between 2000 and 2014, distracted driving contributed to a crash every 2.5 hours and a traffic-related injury every three hours.²⁷

²⁷ [Distracted Driving: An Epidemic – A Study of Distracted Driving Attitudes, Behaviors and Barriers Preventing Change](#), prepared for the Oregon Department of Transportation, Southern Oregon University, March 2016

A disproportionate amount of serious crashes occur on arterial streets – high-speed, high-volume streets that have four or more lanes. Per mile travelled, arterial and collector roadways experience more serious crashes than freeways and their ramps. Although these arterials make up only 6 percent of the region’s roads, 73 percent of serious and fatal crashes occur on them. Many of these dangerous streets extend through neighborhoods with high concentrations of communities of color and people with low incomes, where people are more likely to be walking, biking or using transit. As a result, these communities also bear a disproportionate amount of the region’s serious crashes.



While eliminating traffic related deaths and severe injuries can seem like a daunting goal, partners in the greater Portland region are taking action to address the issue head on. Clackamas County has been a leader in setting aggressive safety targets. The county was the first local government in the state to develop a safety action plan. It uses the Toward Zero Deaths framework. The City of Portland has adopted a Vision Zero for 2025 and developed an ambitious Vision Zero Plan with an equity lens. In 2016, the City of Hillsboro adopted a safety action plan with a target of zero by 2035. Beaverton completed a Transportation Safety Action Plan in 2017 with a goal of zero fatalities and severe injuries by 2035. Washington County has completed a plan with a vision of moving towards zero deaths. In 2016, Oregon adopted its Transportation Safety Action Plan with a target of zero serious crashes by 2035.

4.6.7 Earthquake vulnerability, security and emergency management

In the next 50 years there is a significant risk that Oregon will experience a 9.0 Cascadia Subduction Zone earthquake and tsunami. As noted in the Oregon Resilience Plan, when a large earthquake is triggered within the Cascadia subduction zone, the result will be wide spread disruption of the transportation system. This disruption will make rescue and recovery operations in many areas difficult, if not impossible, and will have an immediate, disruptive impact on the economy. Thus the resilience of the transportation network is considered a key factor for re-establishing other lifelines after a major Cascadia subduction zone earthquake.²⁸

The plan’s Transportation Task Group assessed the seismic integrity of Oregon’s transportation system, including bridges and highways, rail, airports, water ports and public transit systems, examined the special considerations pertaining to the Columbia and Willamette River navigation channels, and characterized the work deemed necessary to restore and maintain transportation lifelines after a Cascadia earthquake and tsunami. Recommendations in the plan for improving

²⁸ [*The Oregon Resilience Plan, Reducing Risk and Improving Recovery for the Next Cascadia Earthquake and Tsunami*](#), Oregon Seismic Safety Policy Advisory Committee, February 2013

the resilience of transportation are based on the assumption that incremental improvements will be made over a 50-year timeframe. While these improvements are costly and spread out over a long time period, they must be initiated as a resilient transportation network is critical for re-establishing other lifelines, such as water, electricity, fuel, communication, and natural gas, after the earthquake. As noted in *One Oregon: A Vision for Oregon's Transportation System*, a \$92 billion economic loss can be avoided through a \$1.8 billion investment in seismic resiliency.²⁹

Terrorist events and natural disasters such as Superstorm Sandy provide good illustrations of the challenges facing metropolitan areas in preparing for and responding to unexpected security incidents or natural disasters. Effective coordination and communication among the many different operating agencies in a region and across the nation is absolutely essential.³⁰ Such coordination is needed to allow enforcement/security/safety responses to occur in an expeditious manner, while at the same time still permitting the transportation system to handle the potentially overwhelming public response to the security incident or natural disaster.

The Regional Disaster Preparedness Organization (RDPO) is a partnership of governmental agencies, non-governmental organizations and private sector stakeholders in the Portland metropolitan region collaborating to increase the region's resiliency to disasters. The RDPO formed in 2012 out of a desire to build upon and unify various regional preparedness efforts in the region including the Regional Emergency Management Group (REMG), the Urban Areas Security Initiative (UASI) Program and several discipline specific coordination groups. The mission of the RDPO is to build and maintain regional disaster preparedness capabilities through strategic and coordinated planning, training and exercising, and investment in technology and specialized equipment.



Effective coordination and communication between many different agencies in the region is critical in the event a natural disaster. Formed in 2012, the Regional Disaster Preparedness Organization is coordinating local, state and regional efforts to prepare for emergencies and plan for recovery.

The RDPO-funded Oregon Department of Geology and Mineral Industries (DOGAMI) Enhanced Earthquake Impact Study (2017) assessed seismic vulnerability of bridges in the region. The Sellwood Bridge and Tillikum Crossing Bridge have been built to be seismically resilient. In addition, planning work is under way for a seismic retrofit of the Burnside Bridge.

²⁹ *One Oregon: A Vision for Oregon's Transportation System*, May 2016

³⁰ *The Role of the Metropolitan Planning Organization (MPO) In Preparing for Security Incidents and Transportation System Response*, Michael D. Meyer, Ph.D., P.E. Georgia Institute of Technology. Accessed December 4, 2018 at www.planning.dot.gov/Documents/Securitypaper.htm



The I-5 Bridge crossing the Columbia River that connects Portland to Vancouver is seismically vulnerable,

Figure 4.48 Seismic vulnerability of the region's bridges for Cascadia Subduction Zone quake

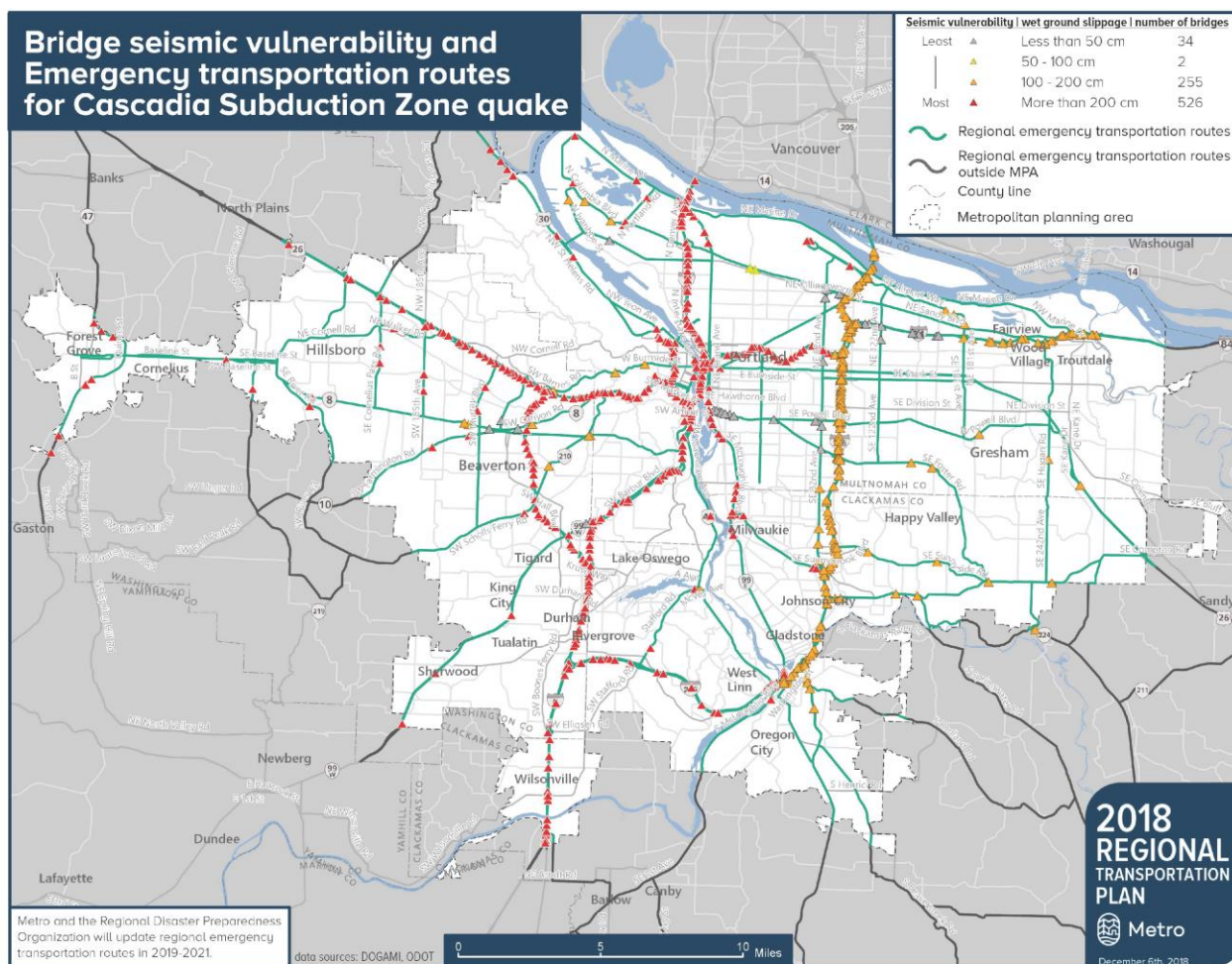
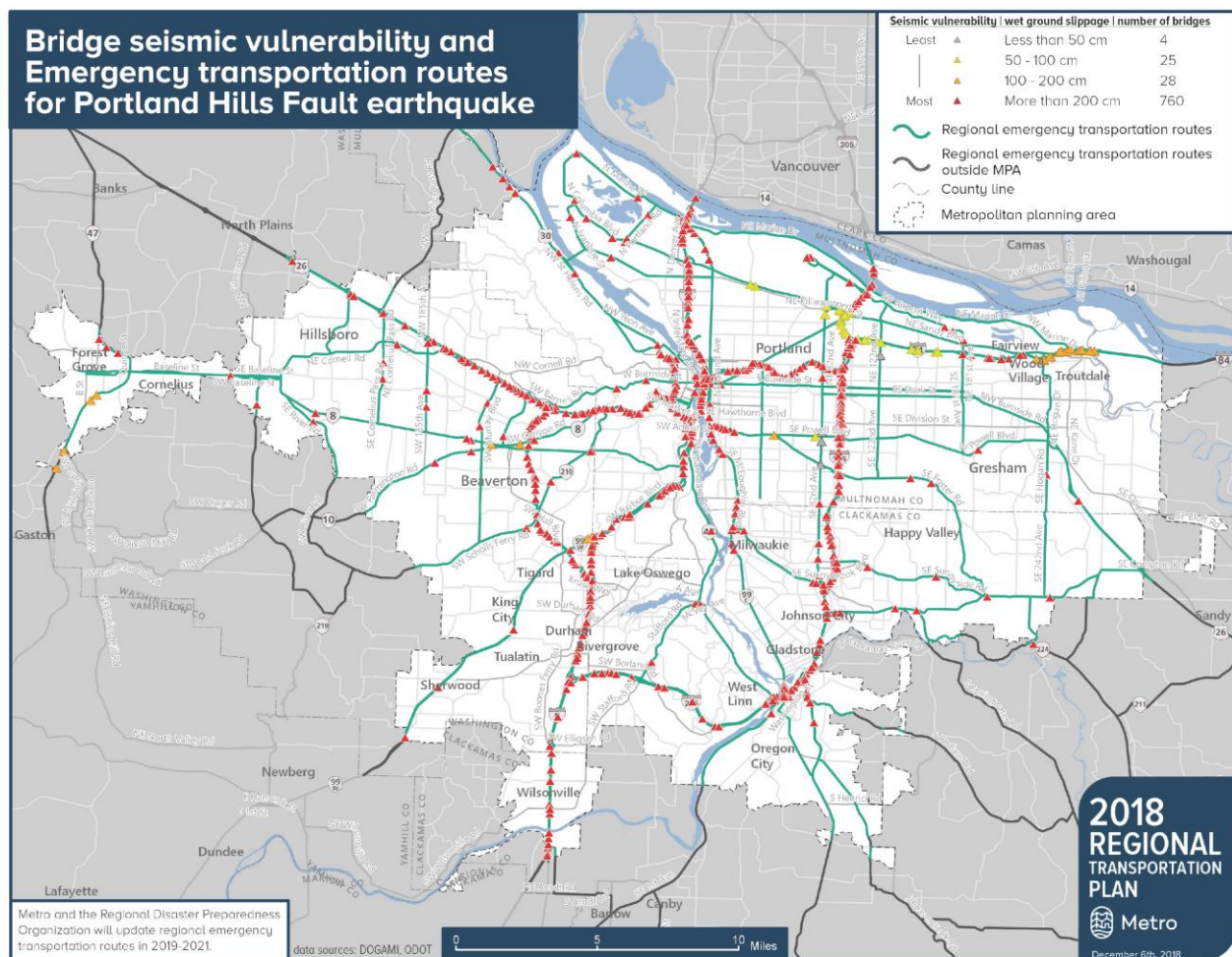


Figure 4.49 Seismic vulnerability of the region's bridges for Portland Hills Fault quake



Chapter 8 of the RTP calls for updating the region's emergency transportation routes (last updated in 2006) and implementing investments to increase resilience of the region's transportation system. These types of investments would enhance existing coordination and communication efforts in the region, and recognize these facilities would serve as the primary transportation network in the event of a regional emergency or natural disaster.

The Regional Disaster Preparedness Organization is working with Metro and other local, state and regional agencies to identify critical infrastructure in the region, assess social and security vulnerabilities and develop coordinated emergency response and evacuation plans, among other projects that aim to create a secure, disaster-resilient region.

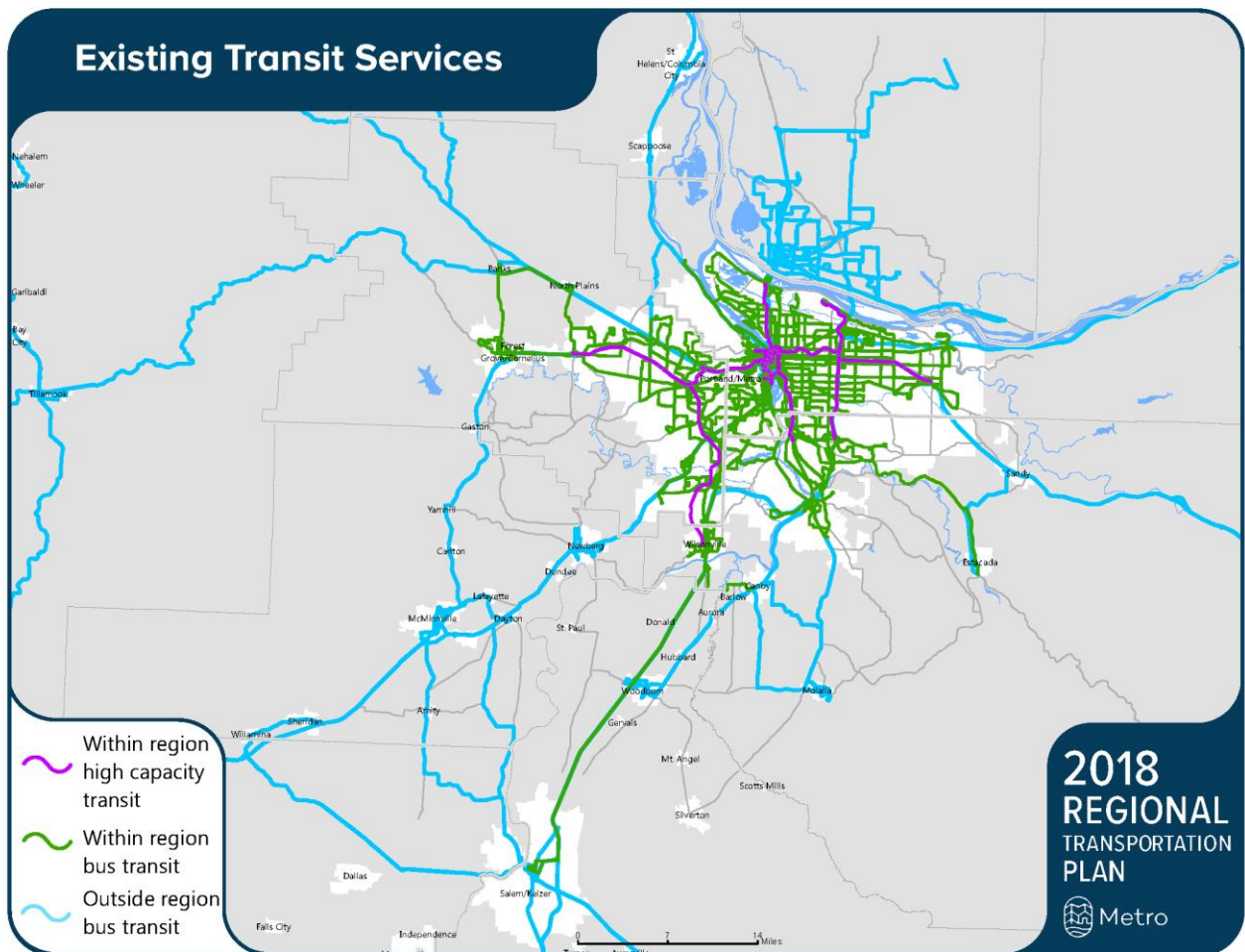
4.6.8 Gaps in transit, biking and walking connections

Increasing transit service is a key component of Metro’s Climate Smart Strategy for the Portland metropolitan region. The strategy identified making transit convenient, frequent, accessible and affordable as one of the most promising approaches to meet adopted targets for reducing greenhouse gas emissions from light-duty vehicles while creating healthy and equitable communities and a strong economy. To meet this goal new performance measures to increase the number of jobs and households, including low-income households, within a ¼-mile of 15-minute service or better by 2040 were identified. In addition air quality-related federal laws require consistent transit service growth over time.

The transit system is especially important in ensuring mobility for people with low-income and people of color, who are twice as likely to be frequent transit riders as higher-income persons or White people. It is also critical to ensuring mobility for people who can’t drive due to age or disability, or who simply choose not to own a personal vehicle. There are numerous ways to measure the busiest transit lines in the region. Two options are the total number of passengers boarding and the productivity of the line – that is, the number of people boarding for every hour it operates.

Figure 4.50 shows the existing transit system for the greater Portland region and beyond. Adding additional transit lines is part of the region’s strategy to addressing the challenge of transit gaps.

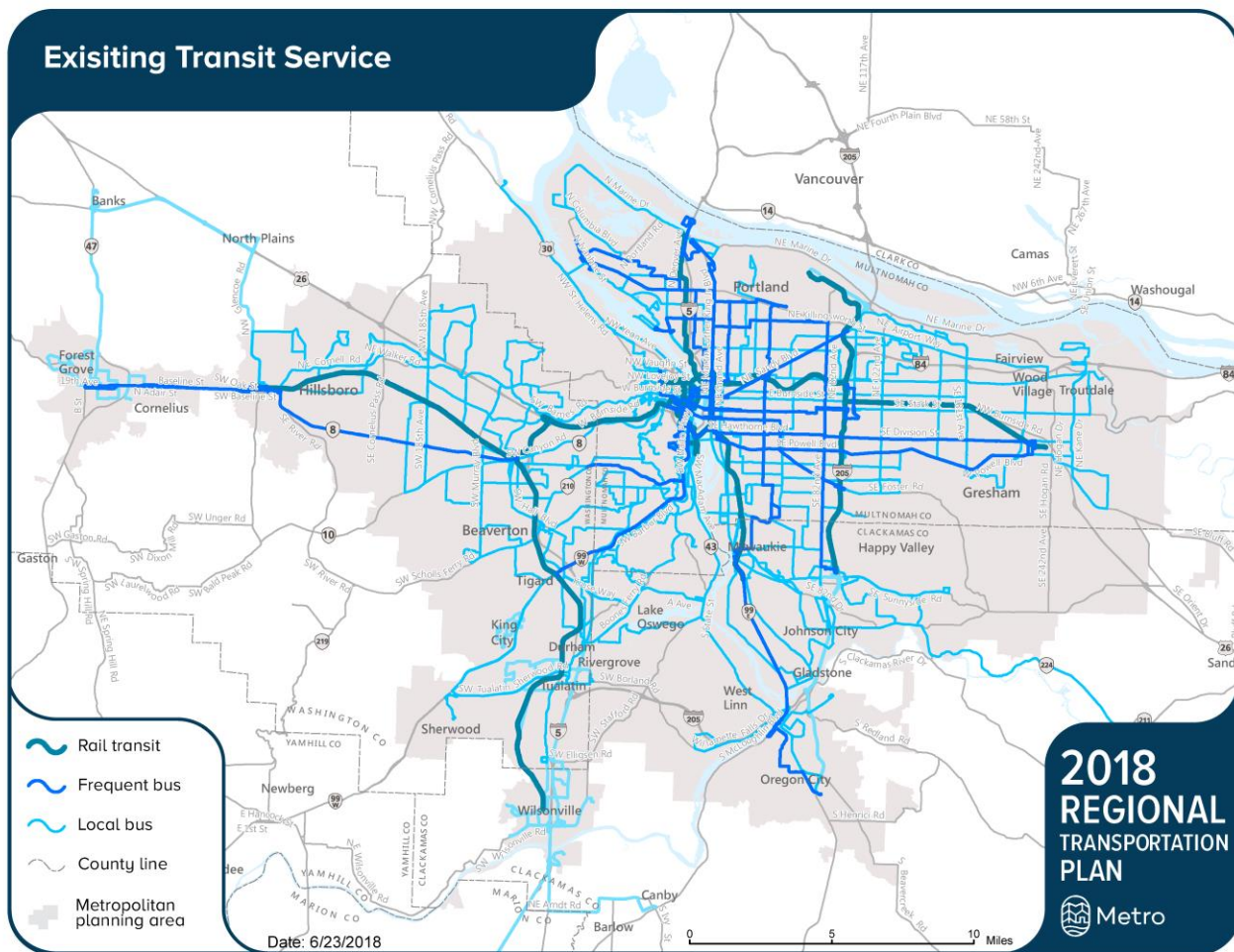
Figure 4.50 Existing transit services in the greater Portland region and beyond



Increasing level of transit service can be just as critical to filling “transit gaps” as is adding new lines.

Figure 4.51 shows existing level of service on the transit system today.

Figure 4.51 Existing transit service, 2018



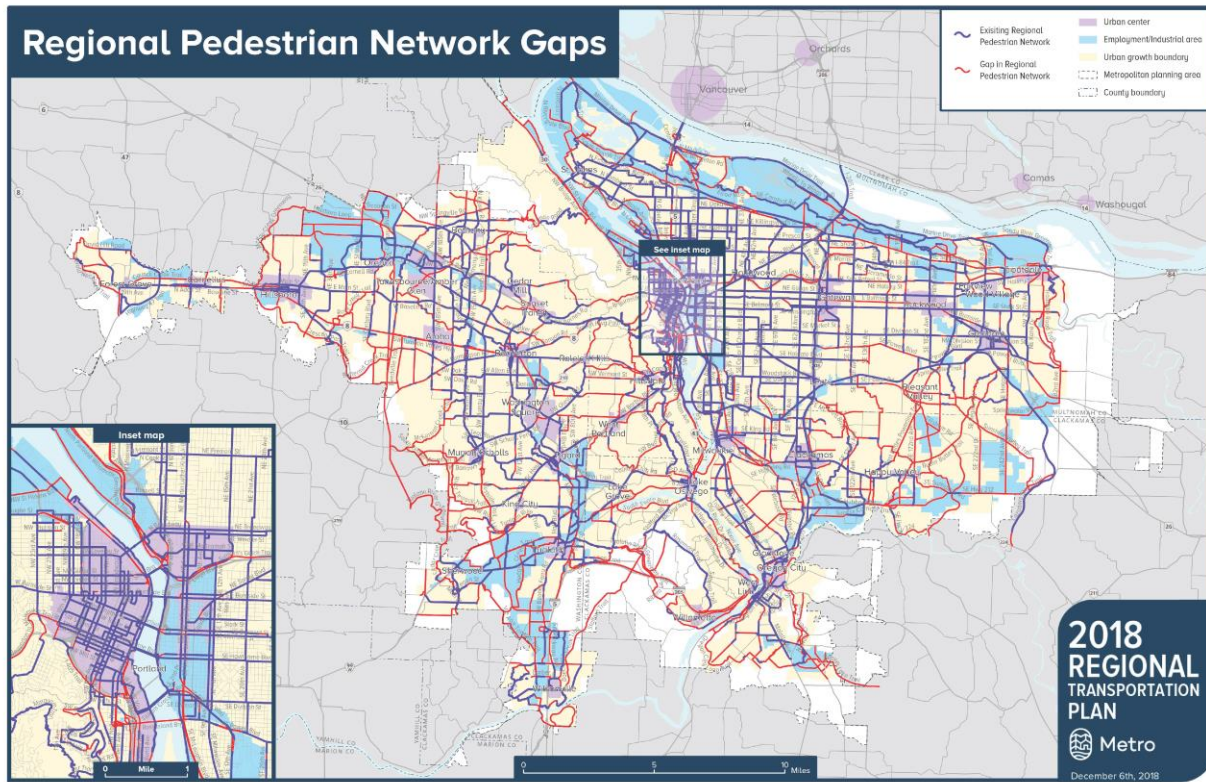
Gaps in sidewalks, bikeways and regional trails are hindering the region’s ability to take full advantage of these affordable and healthy forms of transportation. Gaps in walking and bicycling facilities are impacting safety for the region’s most vulnerable roadway users and deterring people from using these modes of transportation and from accessing transit.

Table 4.6 Percent of regional active transportation network complete

Planned regional pedestrian network (sidewalks on at least one side of roadway)	60%
Planned regional bicycle network (on-street bikeways)	54%
Planned regional trail network (on the regional bike and pedestrian networks)	36%

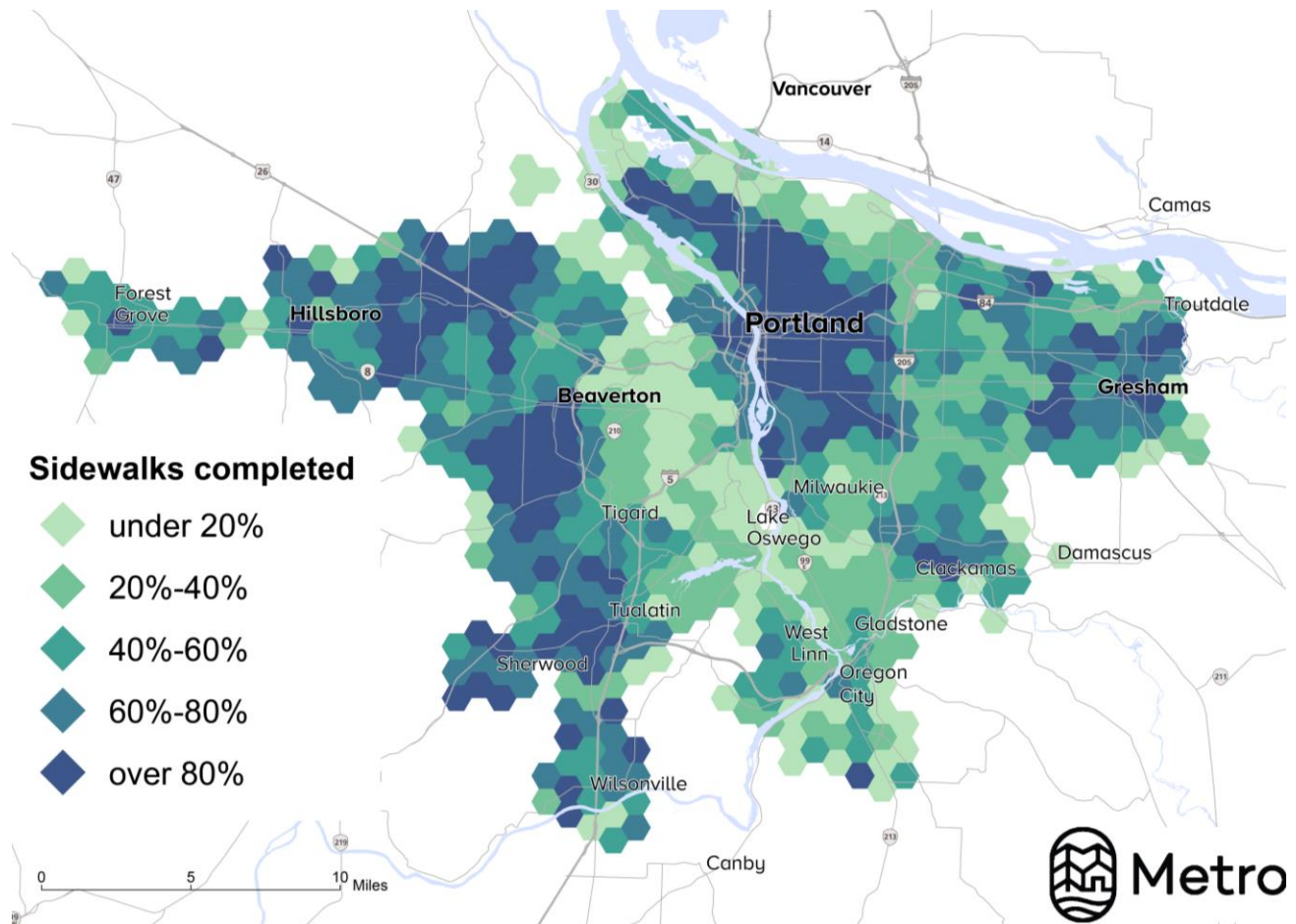
Approximately 60 percent of the planned regional pedestrian system has completed sidewalks on at least one side of the road. The regional pedestrian network inventory was last updated in 2012, and the regional bicycle network inventory was last updated in 2018.

Figure 4.52 Regional pedestrian network gaps, 2012



Significant portions of the region have pedestrian connections while other areas are lacking sidewalks, as seen in **Figures 4.52** and **4.53**.

Figure 4.53 Level of sidewalk completion in the greater Portland region, 2012



Approximately 54 percent of the planned regional bicycle network is complete. However, some existing facilities need to be improved to accommodate higher volumes of bicycle riders or to increase safety and level of comfort to attract more bicycle riders and prevent serious crashes.

Figure 4.54 shows the planned regional bicycle network, existing facilities and gaps that need to be filled.

Figure 4.54 Regional bicycle network gaps, 2016

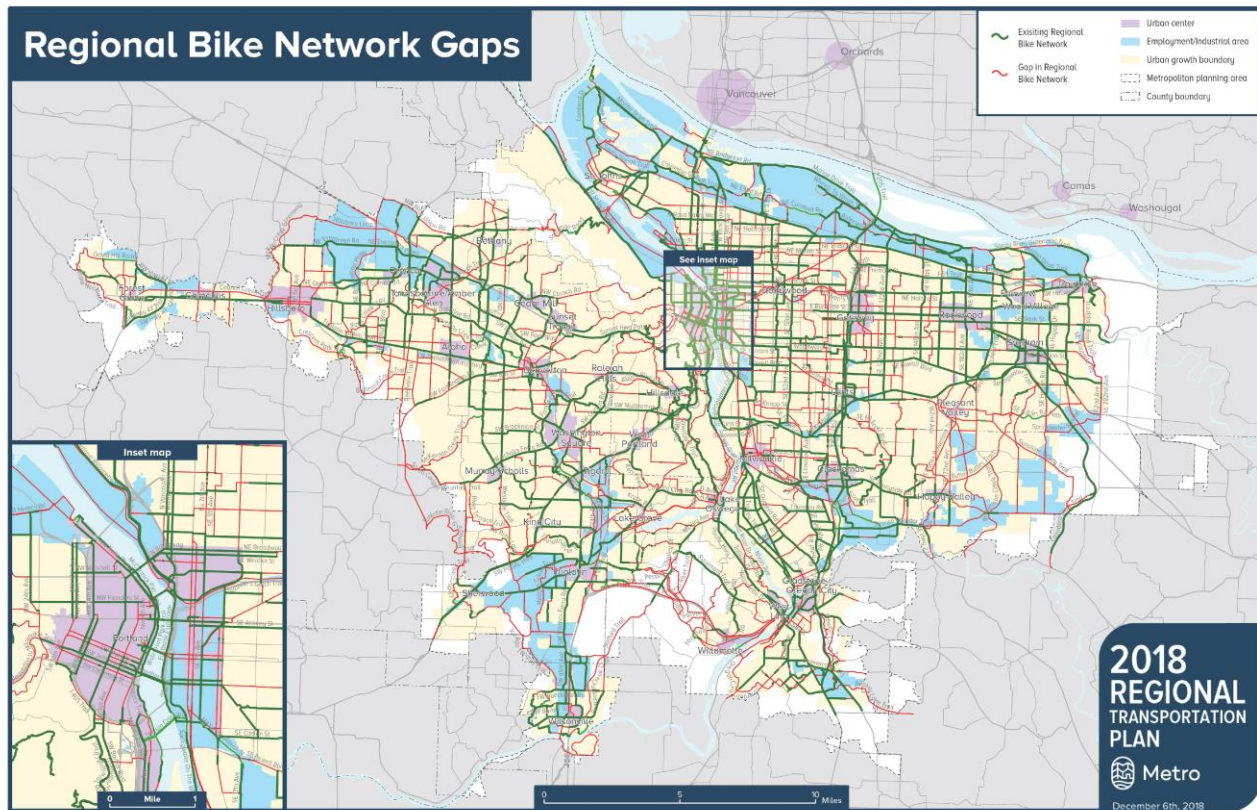
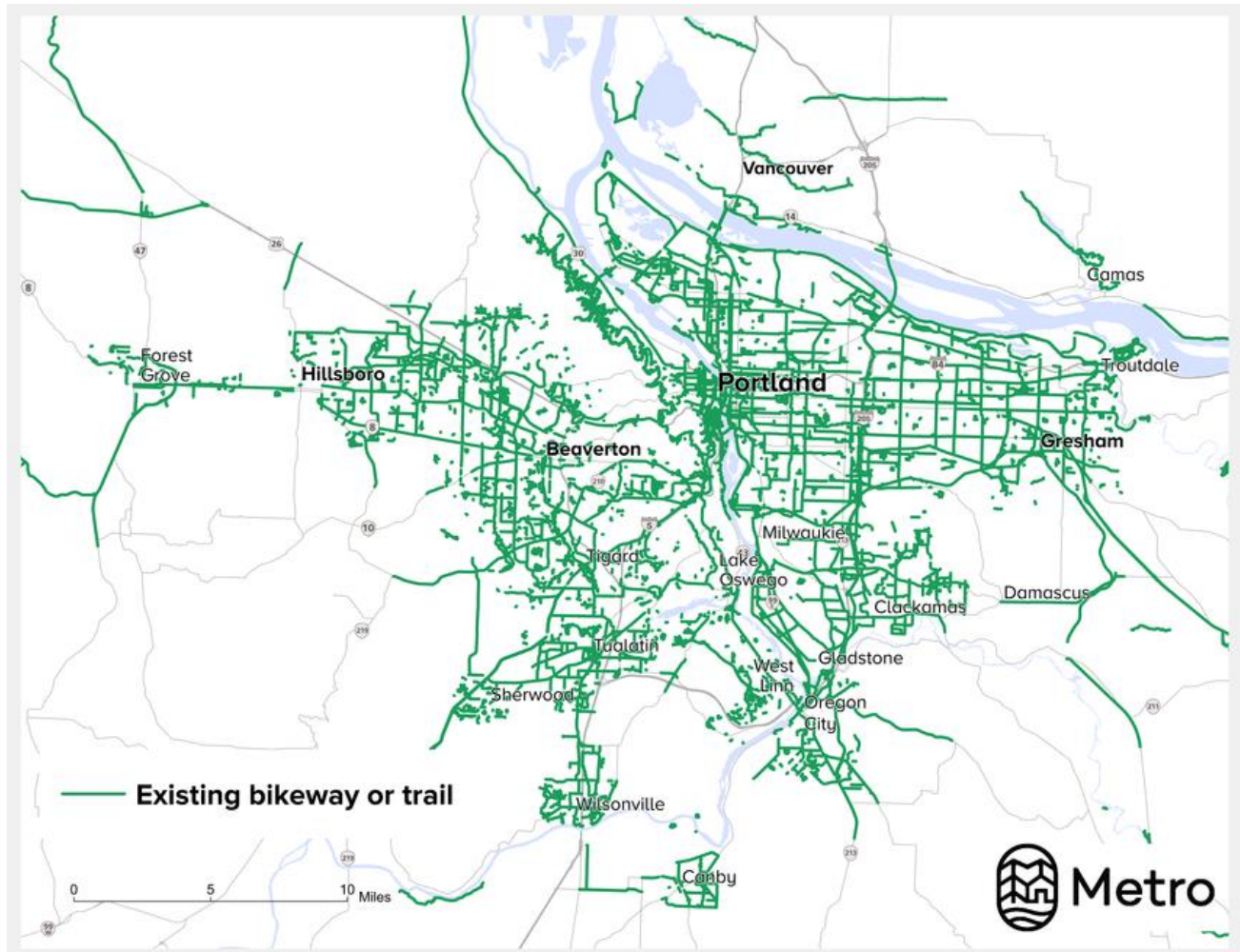


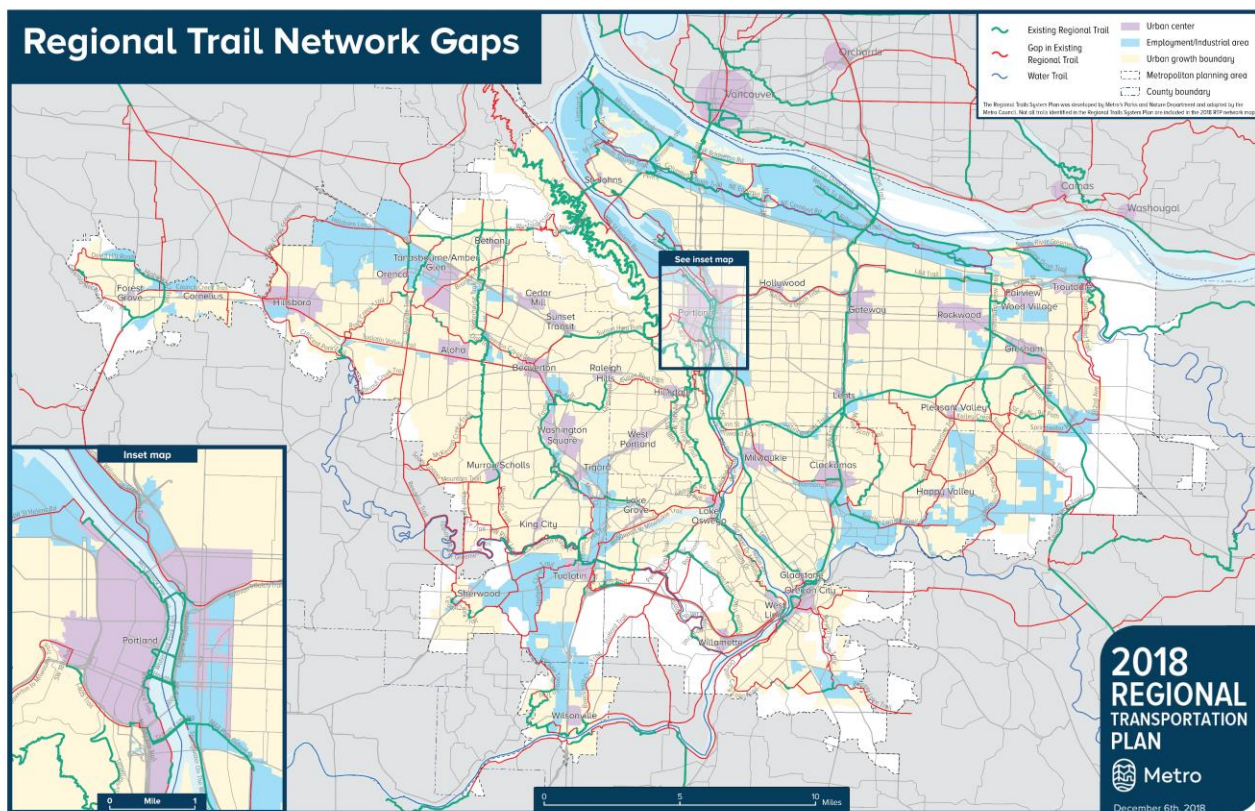
Figure 4.55 shows existing bicycle facilities in the greater Portland region in 2018. Currently, only 36 percent of all arterial roadways in the greater Portland region have bicycle facilities, and only 27 percent of all streets within 2040 centers have bicycle facilities. While demand for bicycling continues to grow the region is not taking full advantage of and supporting this affordable, reliable and healthy form of transportation.

Figure 4.55 Existing bikeways in the greater Portland region, 2018



Regional trails are a critical part of the active transportation network. Trails provide some of the most comfortable and safe facilities for walking and bicycling, especially when designed with Crime Prevention Through Environmental Design principles. Regional trails are challenging to build and often require multiple partners and jurisdictions coordinating. Federal funding regulations can increase costs by up to 30 percent. Currently, approximately 36 percent of the planned regional trail network within the metropolitan planning area boundary is complete.

Figure 4.56 Regional trail existing system gaps



4.6.9 Social inequity and disparities

The 2018 RTP offers opportunities to reduce barriers and disparities faced by communities of color and other historically marginalized communities.

Racial exclusion and bias leading to racial disparities

Oregon's history is rooted in racial bias, which has led to the greater Portland region having less racial diversity than other American cities. The history of Oregon's exclusionary laws dates back to 1848, when the Oregon Territory provisional government made it unlawful for Black people to live in the territory. The 1850 Donation Land Claim Act encouraged White settlers to move to the territory before any attempt was made to have the land ceded by the indigenous people – including the Multnomah, Clackamas, Tualatin and Chinook peoples of what would become the greater Portland region. In 1862, Oregon adopted a law requiring all African American, Chinese and Hawaiian people residing in Oregon to pay an additional annual tax. The Chinese Exclusion Act was passed in 1882 with the support of the state's full congressional delegation. Oregon's tensions around race continued to escalate and by the 1920s, Oregon had the nation's highest per capita membership in the Ku Klux Klan.

Through the 1940s, government policies prevented people of color from buying or renting homes outside of designated neighborhoods, while Japanese residents were relocated to internment camps during World War II. Through the 1960s and 70s – or later – real estate agents would discourage non-White clients from homes in White neighborhoods, and banks would often refuse loans for those properties when requested by a person of color. Meanwhile, banks would declare investments in homes in African American neighborhoods or other communities of color too risky and refuse loans for those properties.

Implicit and explicit practices of racial exclusion and bias extended to the development of the transportation system. People of color in Oregon had to pay additional surcharges on car insurance up until 1951. When Interstate 5 opened in the 1960s, the new freeway cut a swath through Portland’s established African American neighborhoods, destroying at least 50 square blocks of homes and creating a barrier that still exists today.

Today, communities of color continue to point to issues of racial bias and inequity in enforcement of traffic laws and transit fares. Studies have also shown that drivers in the greater Portland region are significantly less likely to stop to allow an African American pedestrian to safely cross the street. Additionally, people of color are more likely to be victims of traffic fatalities and severe injuries.

Figure 4.57 illustrates where different historically marginalized communities reside in the region, based on the best available data from the U.S. Census Bureau and Oregon Department of Education at the start of the 2018 RTP. The map reflects where there is a significant regional concentration of people of color, people with limited english proficiency and people with lower incomes.

As described in Chapter 3, addressing the needs of these three communities is a policy priority for the RTP, but not with exclusivity to the needs of other marginalized communities, including young people, older adults and people living with disabilities.

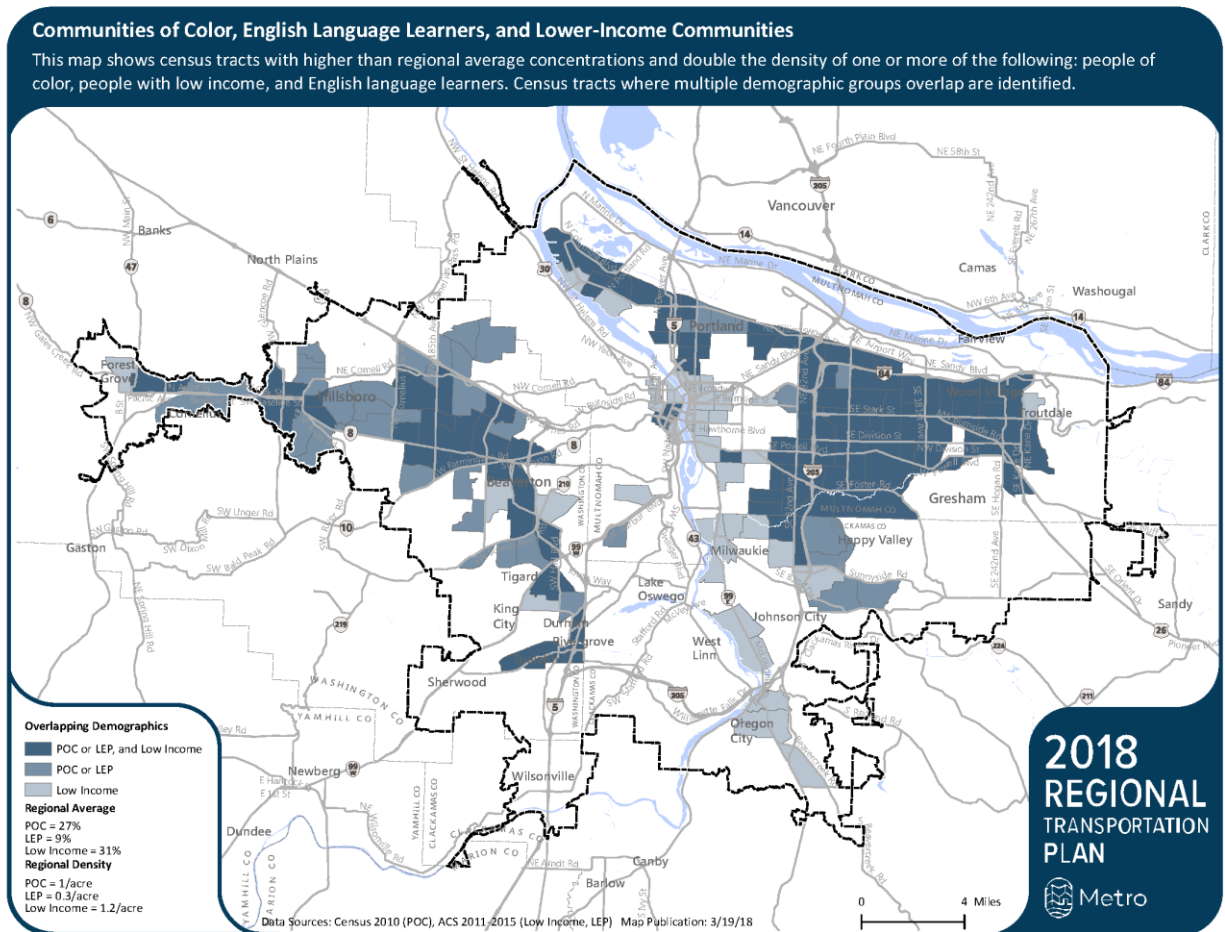


Metro’s strategic plan to advance racial equity, diversity and inclusion

In June 2016 with the support of MPAC, the Metro Council adopted an equity plan that leads with race, committing to concentrate on eliminating the disparities that people of color experience, especially in those areas related to Metro’s policies, programs, services and destinations. People of color share similar barriers with other historically marginalized groups such as people with lower income, people with disabilities, LGBTQ communities, women, older adults and young people. But people of color tend to experience those barriers more deeply due to the pervasive and systemic nature of racism.

By addressing the barriers experienced by people of color, we will also effectively identify solutions and remove barriers for other disadvantaged groups. The result of this racial equity focus will be that all people in the 24 cities and three counties of the greater Portland region will experience better outcomes.

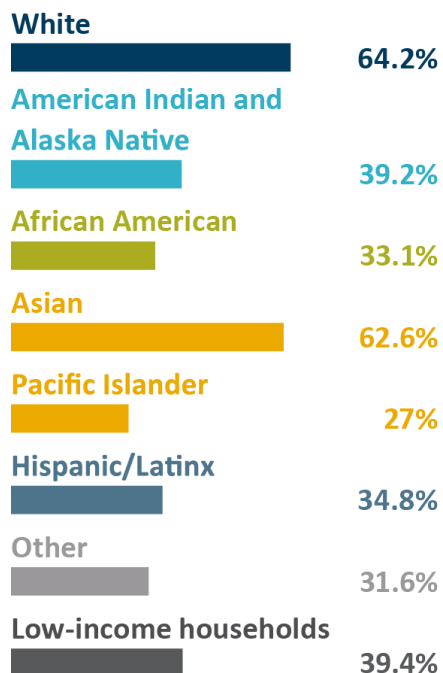
Figure 4.57 RTP equity focus areas



4.6.10 Housing and transportation affordability and displacement

Our region is facing an affordable housing crisis. Homeownership is cited as a key tool in both personal and family wealth development and community stabilization. Not only do people of color face issues of inequity in access to education and pay, the legacy of systemic racism in the region is reflected in current homeownership rates, which differ greatly by race as shown in **Figure 4.58**.

Figure 4.58 Homeownership in the greater Portland region, 2010

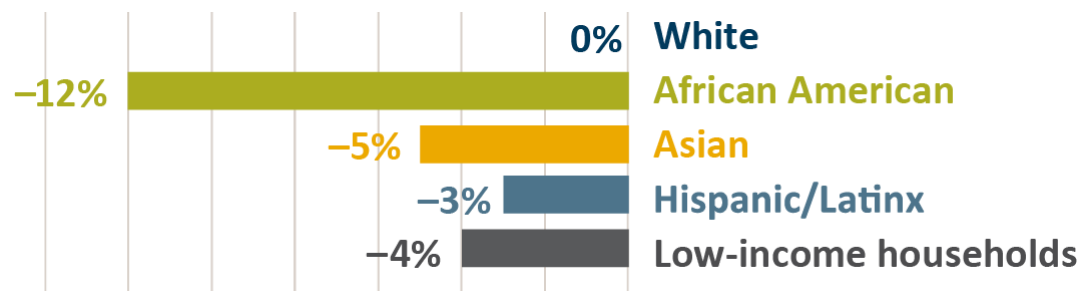


Source: 2010 U.S. Decennial Census

Note: A low-income household is defined as a household making 70 percent of the median family income for the region (approximately less than \$50,000 for a 4 person household).

As housing costs increase, families who own homes benefit from increased home value, while people who rent are forced to move farther from job centers and the community resources they rely on, increasing their daily travel cost and time. The result has seen an increase in travel distance that communities of color face when accessing key resources.

Figure 4.59 Access to jobs within typical commute distance by race and ethnicity in the Portland-Vancouver MSA, percent change from 2002 to 2012



Source: Brookings Institute, *The growing distance between people and jobs in metropolitan America*, 2015

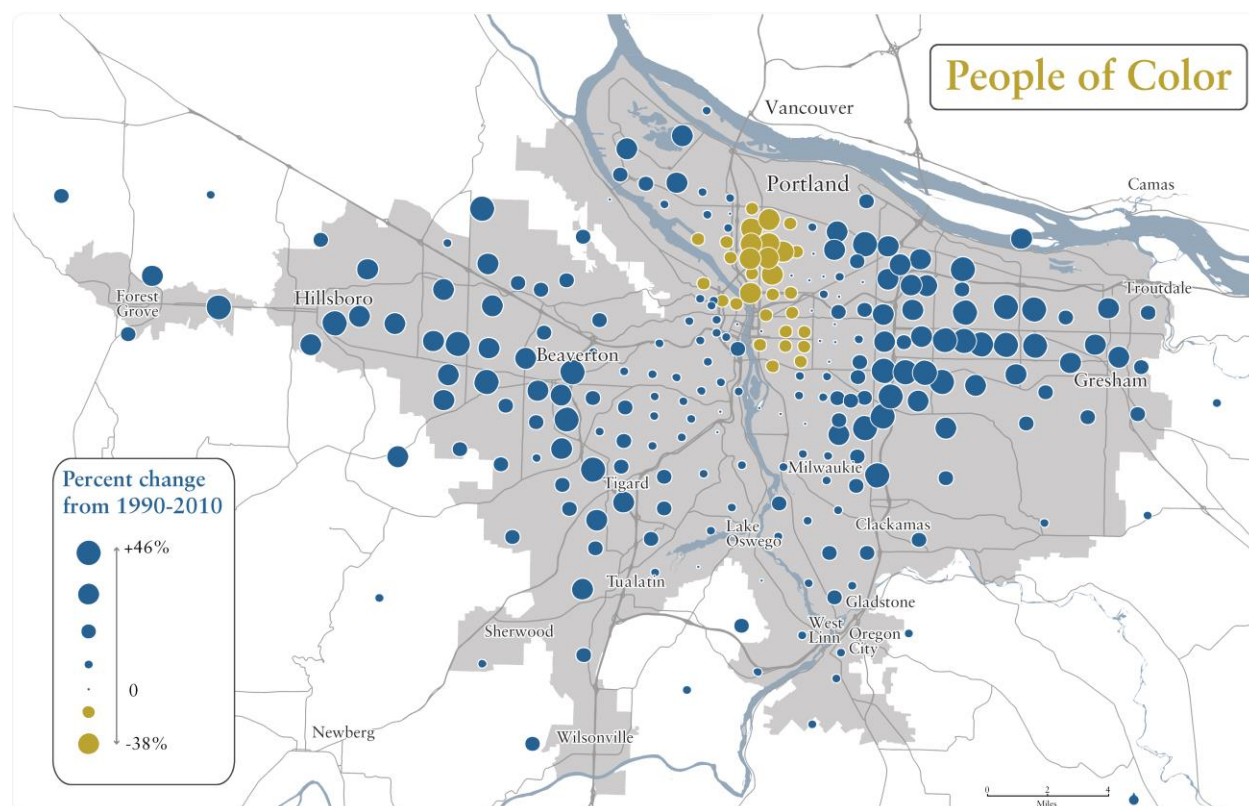
Notes: Original source did not provide information for American Indians or Pacific Islanders. Typical commute distance within the Portland metropolitan region is 7.1 miles.

For example, a 2015 study by the Brookings Institute found that between 2000 through 2012, the number of jobs in a typical commute distance – for the greater Portland region that is 7.1 miles – fell by 1 percent, but for African Americans, Asians, and Latinx the number of jobs fell by 12 percent, 5 percent, and 3 percent during that 12-year period. Whereas for White residents, the number of jobs within a typical commute distance did not change over the past 12 years – as shown in **Figure 4.59**.

Displacement affects communities as much as individuals

Displacement is often seen simply as a consequence of a growing population and an improving economy. Often unrecognized is a history that has concentrated communities of color into specific areas where they built strong community ties. Since these individuals and communities continue to face systemic inequities that limit access to the benefits of an improving economy, they are often priced out of these same areas as others gain stronger purchasing power. Not only does this displacement increase travel time and cost for individuals, it can create a cascading effect on the viability of community resources such as places of worship, community centers and culturally-focused businesses as members, users and customers lose convenient access.

Figure 4.60 Displacement of people of color in the greater Portland region, 1990-2010



Source: 1990 and 2010 U.S. Decennial Census

4.6.11 Technological change

Technology is already transforming the greater Portland region's transportation system. In the City of Portland, ride-hailing services now carry more people than taxis do, providing over ten million rides within the city in 2017. Car share companies including Car2go, ReachNow and Zipcar operate over 1,000 vehicles in the greater Portland region. Some of these companies have been around for a decade, but new models have sprung up, including free-floating car share, which allows people to pick up and drop off a car anywhere within a defined area, and peer-to-peer car share, which makes it easy for neighbors to borrow cars from each other. The City of Portland's bike share system, Biketown, launched in July 2016 and carried over 300,000 trips in its first year, and there are signs that other bike share companies are looking to launch service here soon.

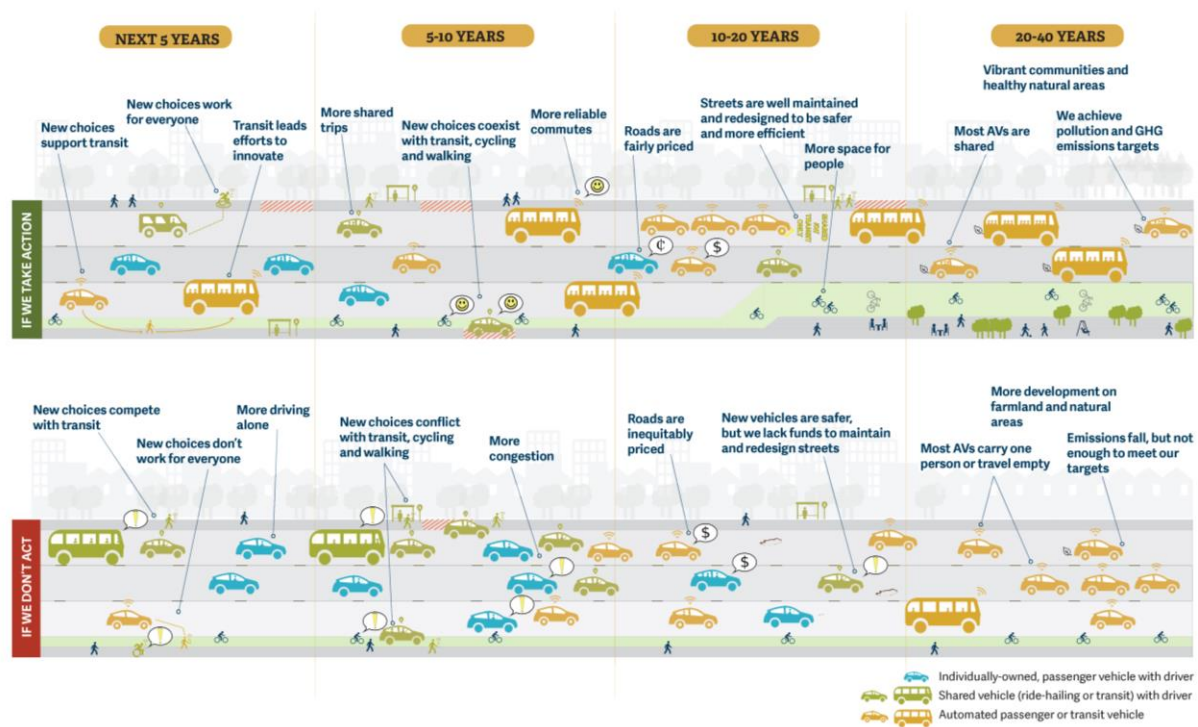
Meanwhile, smartphone apps have become the most popular way for people to get information on their travel choices, while the number of people who get information from other sources declined swiftly over the past three years. People increasingly rely on the real-time information that apps provide to make on-the-go decisions when congestion or a change in circumstances means that they can't take the mode or route that they normally do.

New services like car sharing and ride-hailing are bringing more affordable and efficient options to the region, but some of them may also be competing with transit and increasing congestion. We have new ways to meet the transportation needs of underserved people, but many of these new options are not accessible to all. Surveys conducted by Metro find that a disproportionately large number of frequent ride-hailing users are wealthy and young, while a disproportionately small number are low-income people or people over 45. The impacts are mixed and our information is limited, but it's clear that we're in an era of rapid change, and that public agencies need to act to make sure that emerging technology helps create more equitable and livable communities across the greater Portland region.

Many companies are already testing automated vehicles, and we will likely see these vehicles on the streets of our region within the next five years. Autonomous vehicles will likely accelerate the already-growing use of new mobility services when they arrive. New mobility companies are poised to be first to deploy shared autonomous vehicles, which could enable them to cut the cost of trips and serve new users.

These developments will deepen the impacts that technology is already having and affect how some of the most pressing issues facing our region play out. The greater Portland region has inequitable access to safe, reliable, healthy and affordable ways to get around and is experiencing rapid population growth, rising housing costs and increasing congestion. Emerging technology has the potential to help us confront these challenges – transportation equity, congestion, advancing the public interest - or to exacerbate them.

Figure 4.61 How technological change could impact the greater Portland region's future



Source: 2018 Emerging Technology Strategy, Metro

If you picnic at Blue Lake or take your kids to the Oregon Zoo, enjoy symphonies at the Schnitz or auto shows at the convention center, put out your trash or drive your car – we’ve already crossed paths.

So, hello. We’re Metro – nice to meet you.

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