

APPENDIX 5: RESIDENTIAL DEVELOPMENT TRENDS

Background

To better understand how to plan for people’s future housing needs, it is useful to understand past residential development trends. This report provides indicator data required under ORS 197.296 (the “needed housing” statute) and also has data for ORS 197.301 (metropolitan service district performance measures). This report also adds housing affordability statistics by race given Metro’s commitment to applying an equity lens to its work. Note that since by law Metro’s UGB decision is made at the regional level, this Appendix (as did Appendix 4) provides data only at the regional level. A later Metro process (the Distributed Forecast) will address city-level details in further coordination with cities and counties. Individual cities may also provide more detail through their own planning processes. The Urban Growth Report addresses most aspects of ORS 197.301; Metro delivers biannual reports to the Department of Land Conservation and Development (DLCD) that address other aspects including ORS 197.301 (h) and (i).

ORS 197.296

(5)(a) Except as provided in paragraphs (b) and (c) of this subsection, the determination of housing capacity and need pursuant to subsection (3) of this section must be based on data relating to land within the urban growth boundary that has been collected since the last periodic review or five years, whichever is greater. The data shall include:

- (A) The number, density and average mix of housing types of urban residential development that have actually occurred;
- (B) Trends in density and average mix of housing types of urban residential development;
- (C) Demographic and population trends;
- (D) Economic trends and cycles; and
- (E) The number, density and average mix of housing types that have occurred on the buildable lands described in subsection (4)(a) of this section

ORS 197.301

Performance measures subject to subsection (1) of this section shall be adopted by a metropolitan service district and shall include but are not limited to measures that analyze the following:

- (a) The rate of conversion of vacant land to improved land;
- (b) The density and price ranges of residential development, including both single family and multifamily residential units;
- (c) The level of job creation within individual cities and the urban areas of a county inside the metropolitan service district;
- (d) The number of residential units added to small sites assumed to be developed in the metropolitan service district's inventory of available lands but which can be further developed, and the conversion of existing spaces into more compact units with or without the demolition of existing buildings;
- (e) The amount of environmentally sensitive land that is protected and the amount of environmentally sensitive land that is developed;
- (f) The sales price of vacant land;
- (g) Residential vacancy rates;
- (h) Public access to open spaces; and
- (i) Transportation measures including mobility, accessibility and air quality indicators.

Terms and definitions

Single family houses were identified from Metro assessor data as tax lots with a land use designation of SFR or RUR (translated from PCA codes). Building value, building square footage, year built and other attributes were also used to identify lots with a house on them.

Multifamily dwellings were identified from Metro’s multifamily housing inventory. The inventory includes the obvious apartments and high density condos, as well as some other less clearly defined housing types. A duplex, triplex, or any other lot with multiple housing units under common ownership on a single tax lot would be included. Any development with condo style tax lots is included, identified by individually owned units within a common lot owned by a condo association or similar organization. Single family housing developments with common areas owned by a Homeowners Association are not included in multifamily. Most attached single family houses have single family style tax lots and are not included in the multifamily database. This analysis excludes dormitories and retirement facilities, which are typically a single room occupancy style of housing.

Infill refers to development that occurred on a tax lot that would be considered “developed” in Metro’s buildable lands inventory, where the original structure has been left intact. Infill may include residential units being added to the same lot with existing development, as well as splitting lots off from the existing development for new residential units.

Redevelopment refers to development that occurred on a tax lot that would be considered “developed” in Metro’s buildable lands inventory, where the original structure was demolished to make room for new construction. Redevelopment may or may not involve subdividing or reconfiguring the original tax lot to accommodate new development.

Vacant implies that development occurred on land that would be considered “vacant” in Metro’s buildable lands inventory, and the lot has no indication of prior development in the recent past and was not part of a developed tax lot in the recent past (generally back to 2003 for the purposes of this analysis – a consequence is that historic redevelopment and infill may be underestimated if a tax lot was previously developed, but has been vacant since 2003).

This report generally focuses on gross new units. This differs from total reported building permits, in that it reflects an estimate of what was actually built, rather than all issued permits, some of which don’t get built or are later modified to change unit counts. It also does not reflect units lost in redevelopment, which is estimated at 7% of total new units built.

People of color

Diversity, equity and inclusion are cornerstone values in Metro policy. This information helps provide contextual information that informs policy makers.

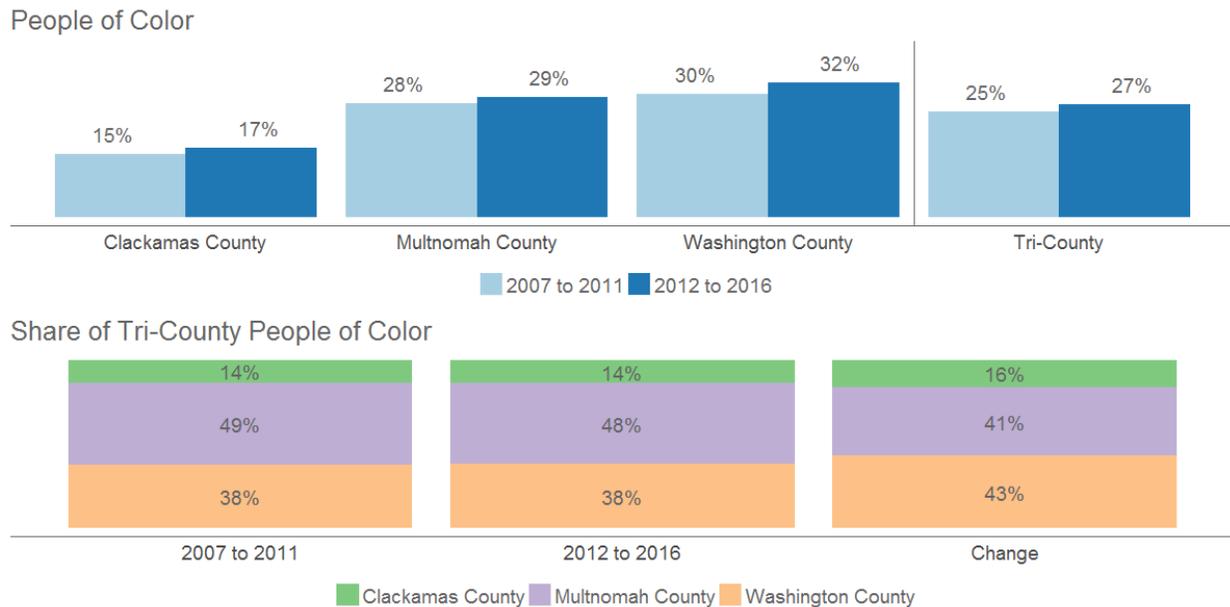


Figure 1: Unemployment in Clackamas, Multnomah, and Washington Counties

- The Tri-County region experienced an approximate 2 percentage point increase in people of color¹, which was the result of an approximate increase of 62,000 people of color.
- Although comprising only 38% of the Tri-County region’s people of color, Washington County received 43% of the increase.

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP05; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

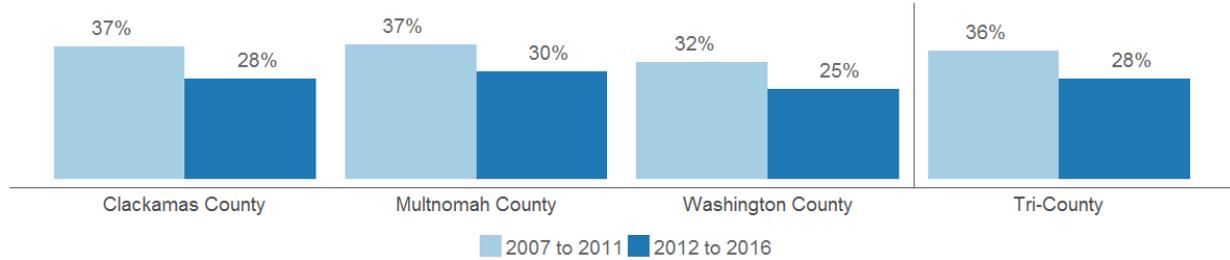
U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP05; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

¹ The term “people of color” is defined as the combination of all race/ethnicity categories in the American Community Survey besides “white alone, not Hispanic or Latino”.

Cost-burdened home owners

Cost-burdened households are of regional significance. Metro has made it a policy goal to seek solutions for making housing costs more attainable to working class and low income residents of the region.² This indicator provides contextual information that informs policy makers and reveals relevant details to residential price indicators referred to in ORS 197.301.

Cost-Burdened Owner-Occupied Units as a Share of Owner-Occupied Units



Share of Tri-County Cost-Burdened Owners

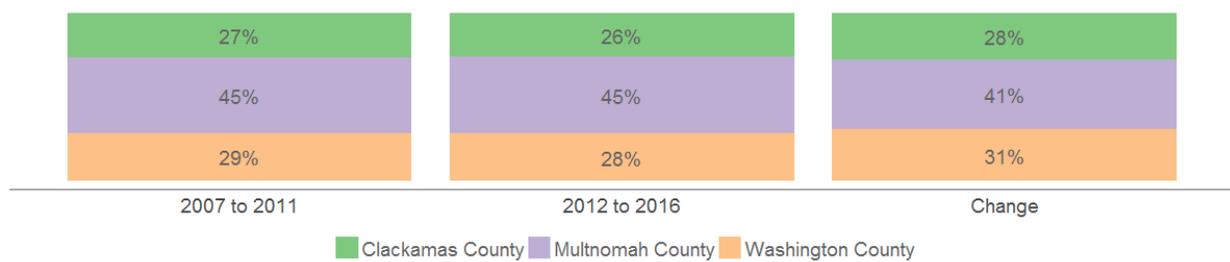


Figure 1: Cost-burdened owners in Clackamas, Multnomah, and Washington counties

- County shares of cost-burdened owners significantly decreased by approximately 7 to 9 percentage points, while overall the Tri-County region saw a decrease of 8 percentage points. The decreases in cost-burdened owners is a result of the Great Recession which drove down homeownership rates and eliminated the weakest mortgages. This real estate cycle is now swiftly unwinding itself and is not necessarily indicative of longer-term trends³. Other recent statistics suggest cost-burdened owner households are likely to increase.
- Although representing 45% of regional cost-burdened owners, Multnomah County represented only 41% of the regional decrease.

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

² Metro, June 7, 2018, Proposed regional affordable housing bond information, <https://www.oregonmetro.gov/public-projects/affordable-housing-bond-information>

³ The first set of estimates (2007-2011) includes the bubble and downturn preceding the Great Recession, and the second set of estimates includes the economic recovery.

Cost-burdened renters

Cost-burdened renters are of regional significance. Metro has made it a policy goal to seek solutions that would make rents more affordable for working class and low income residents of the region.⁴ This indicator provides contextual information that informs policy makers and reveals relevant details to residential price indicators referred to in ORS 197.301.

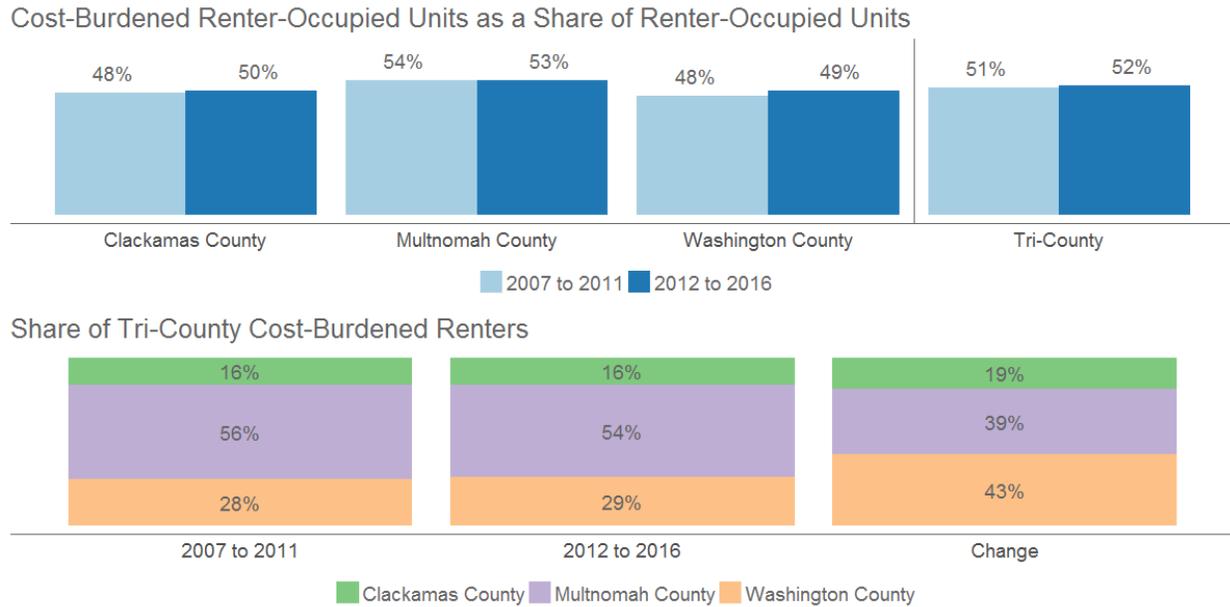


Figure 1: Cost-burdened renters in Clackamas, Multnomah, and Washington counties

- Despite increased totals, county shares of cost-burdened renters did not significantly change. Very slight increases in share of cost-burdened renters were seen in Clackamas and Washington counties.
- Although the change in percentage terms seems slight, registered against total regional households, a 1 percent change means an additional 6,500 cost burdened households
- Although representing only 29% of regional cost-burdened renters, Washington County represented 43% of regional increase.

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Renter and owner income and cost burden by race and ethnicity

⁴ Metro, June 7, 2018, Proposed regional affordable housing bond information, <https://www.oregonmetro.gov/public-projects/affordable-housing-bond-information>

Metro is committed to a focus on racial equity and equity in housing is of great concern to the communities which Metro serves. The table below illustrates the distribution of renters within the region by household income as a percent of median family income (MFI) and the number of cost-burdened and severely-burdened households by demographic group. The income categories (e.g. “Extremely Low Income”) use federal HUD (Housing and Urban Development) break points. Race and ethnicity figures are broadly categorized by white, black, Asian, American Indian & Alaska Native, native Hawaiian & Pacific Islander, Hispanic, or persons of two or more races.

Race and Ethnicity: Compared with Renter Household Income as Percent of Median Family Income (MFI)								
Metro Region - defined as Census tracts intersecting Metro jurisdictional boundary								
Renter Household Income as a Percent of Median Family Income (MFI)	Estimate: White	Estimate: People of Color	Estimate: Black or African- American	Estimate: Asian	Estimate: American Indian and Alaska Native	Estimate: Native Hawaiian and Pacific Islander	Estimate: Hispanic	Estimate: Other (including Two or More Races)
Extremely Low Income (0-30% MFI)	37,200	21,000	5,800	3,300	700	400	8,600	2,100
Very Low Income (30-50% MFI)	29,800	14,700	2,200	2,300	300	300	8,100	1,400
Low Income (50-80% MFI)	39,900	14,500	2,100	2,200	400	500	7,600	1,700
80-100% MFI	21,100	6,900	1,000	1,100	200	200	3,200	1,300
100% + MFI	59,500	15,000	1,900	4,900	400	400	5,100	2,300
Total Renter Households	187,500	72,100	13,000	13,800	2,000	1,800	32,600	8,800
Percent of Regional Distribution	72%	28%	5%	5%	1%	1%	13%	3%
Cost Burdened Renters (Rent > 30% of Income)	87,900	38,200	8,100	6,100	1,100	900	18,100	4,000
Percent of Regional Distribution	70%	30%	6%	5%	1%	1%	14%	3%
Severely Cost Burdened Renters (Rent > 50% of Income)	44,600	21,200	5,200	3,300	600	400	9,500	2,100
Percent of Regional Distribution	68%	32%	8%	5%	1%	1%	14%	3%
Total Households (renter and owner)	490,900	126,100	19,200	36,300	3,200	2,300	49,500	15,500
Percent of Regional Distribution	80%	20%	3%	6%	1%	0.4%	8%	3%

Figure 1: Distribution of Renter Households by Demographic Group, Income, and Cost-Burden

Geography: Metro Region, Source: Tract-level CHAS dataset 2010-2014, Table 1, <https://www.huduser.gov/portal/datasets/cp.html>

Race and Ethnicity: Compared with Owner Household Income as Percent of Median Family Income (MFI)								
Metro Region - defined as Census tracts intersecting Metro jurisdictional boundary								
Owner Household Income as a Percent of Median Family Income (MFI)	Estimate: White	Estimate: People of Color	Estimate: Black or African- American	Estimate: Asian	Estimate: American Indian and Alaska Native	Estimate: Native Hawaiian and Pacific Islander	Estimate: Hispanic	Estimate: Other (including Two or More Races)
Extremely Low Income (0-30% MFI)	15,500	3,400	400	1,300	100	100	1,200	400
Very Low Income (30-50% MFI)	18,700	4,300	500	1,400	100	100	1,700	400
Low Income (50-80% MFI)	37,100	8,200	1,000	2,500	200	100	3,600	800
80-100% MFI	27,500	6,000	700	2,100	200	100	2,300	700
100% + MFI	204,700	32,100	3,600	15,200	700	200	8,100	4,200
Total Owner Households	303,500	54,000	6,200	22,500	1,300	600	16,900	6,500
Percent of Regional Distribution	85%	15%	2%	6%	0.4%	0.2%	5%	2%
Cost Burdened Owners (Owner Costs > 30% of Income)	86,800	19,300	2,400	7,200	400	300	6,600	2,400
Percent of Regional Distribution	82%	18%	2%	7%	0.4%	0.3%	6%	2%
Severely Cost Burdened Owners (Owner Costs > 50% of Income)	32,900	8,000	1,000	3,000	100	100	2,600	1,200
Percent of Regional Distribution	80%	20%	2%	7%	0.2%	0.2%	6%	3%
Total Households (renter and owner)	490,900	126,100	19,200	36,300	3,200	2,300	49,500	15,500
Percent of Regional Distribution	80%	20%	3%	6%	1%	0.4%	8%	3%

Figure 2: Distribution of Owner Households by Demographic Group, Income, and Cost-Burden

Geography: Metro Region, Source: Tract-level CHAS dataset 2010-2014, Table 1,
<https://www.huduser.gov/portal/datasets/cp.html>

- This slice (2010 to 2014) of CHAS data shows that: 38% of whites are renters; 57% of people of color are renters
- 57% of white renters have an income 80% or below MFI
- 70% of renters of color have an income 80% or below MFI
- 47% of white renters are cost burdened (i.e., rent > 30% of income), while 53% of renters of color are cost burdened
- 28% of all renters are people of color while 30% of all cost-burdened renters are people of color
- 5% of all renters are African-American while 8% of all cost-burdened renters are African-American
- 85% of all owners are white while 80% of cost-burdened owners are white
- 15% of all owners are people of color while 20% of cost-burdened owners are people of color
- 2% of all owners are African-American, while 3% of cost-burdened owners are African American

Source: CHAS 2010-2014, HUD

Notes

- Household totals are derived from sums of detail columns for household income brackets relative to race and ethnicity. CHAS detail columns don't always match the sum of subtotal columns, which in turn don't always match the total column for a given variable or cross-tabulation.
- Comprehensive Housing Affordability Strategy (CHAS) is the U.S. Housing and Urban Development (HUD) dataset that combines race data to housing, income and other demographic information.

Single- and multifamily housing production trends

Type of residential units (SF / MF) is a regional indicator required by ORS 197.296 and 197.301. Reporting observed data provides contextual understanding of market trends that is used to “determine the number of units and amount of land needed for each needed housing type for the next 20 years.” ORS 197.296(3)(b).

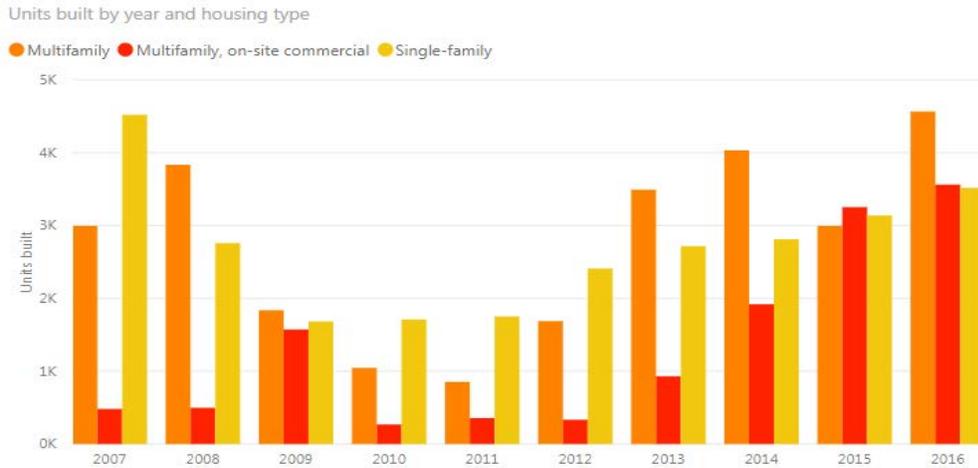


Figure 3: Units built over time by housing type, inside the Urban Growth Boundary. During the recession, single-family housing (SFR) was the predominant housing type, and has trended upward but at a slower pace than multifamily (MFR). In 2016, multifamily (with and without on-site commercial) was more than twice SFR unit production.

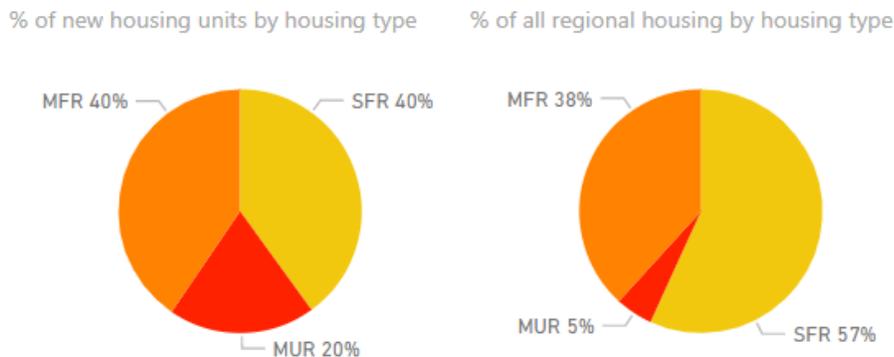


Figure 4: Share of recently built housing (left, past 10 years 2007-2016) and all existing regional housing (right) inside the Urban Growth Boundary. Regionally, we have more single family homes (57%), but multifamily housing makes up a significant portion (43 % including on-site mixed use). Recently, on-site mixed use has become a more prominent share (20% of new units). Single-family is 40% of new units being built.

- Within the UGB, SFR is 57% of all housing, MUR is <5%
- In the past 10 years, SFR has been 40% of all new units built
- MUR (multifamily with on-site commercial) has increased in unit production, providing about 1/3 of total new units in the last 2 years.
- During the Great Recession, more single family housing was built than multifamily housing

Data source: Land Development Monitoring System output dataset, from May 2018 RLIS data input

UGB housing density

Development density is identified as a regional indicator under ORS 197.296 and 197.301

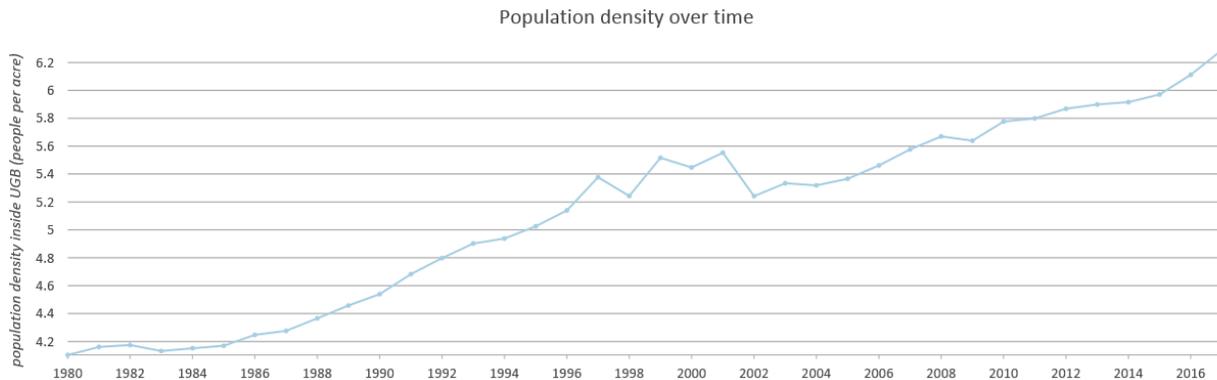


Figure 5: Population density within an expanding Urban Growth Boundary. The urban growth boundary has expanded periodically since its creation in 1979. The largest expansion was in 2002 when the Damascus area was brought into the UGB. The population of the region has also been steadily growing, even through the recent recession. This graph shows the population density within the UGB as both expand over time.

- The Urban Growth Boundary (UGB) has expanded from 227,000 acres in 1979 to 259,000 acres today, an increase of about 14%
- Population has increased from about 940,000 people to 1.63 million, an increase of about 73%
- Population density of the region has increased from 4.1 people/acre to 6.3⁵.
- Largest UGB expansions briefly decreased annual density estimate, like Damascus (12,000+ acres) in 2002, by bringing large unpopulated acres into the UGB.
- Population growth in the region has slowly absorbed the additional land and population density has continued to increase.

Data sources:

1979-1990 population estimates are for the Metro jurisdictional boundary, 1991 and later are for the UGB. Source: Metro Research Center, Census, and ESRI.

⁵ Calculated from population estimate / total UGB acres by year. UGB acres inclusive of all acreage inside boundary including water and non-residential land

How is housing growth occurring in the 2040 Growth Concept centers?

The type of housing units built is identified as a regional indicator under ORS 197.296 and 197.301. This information provides geographic context as to development types and recent development locations.

Units built 2007-2016, by housing type and location in relation to 2040 Growth Concept centers

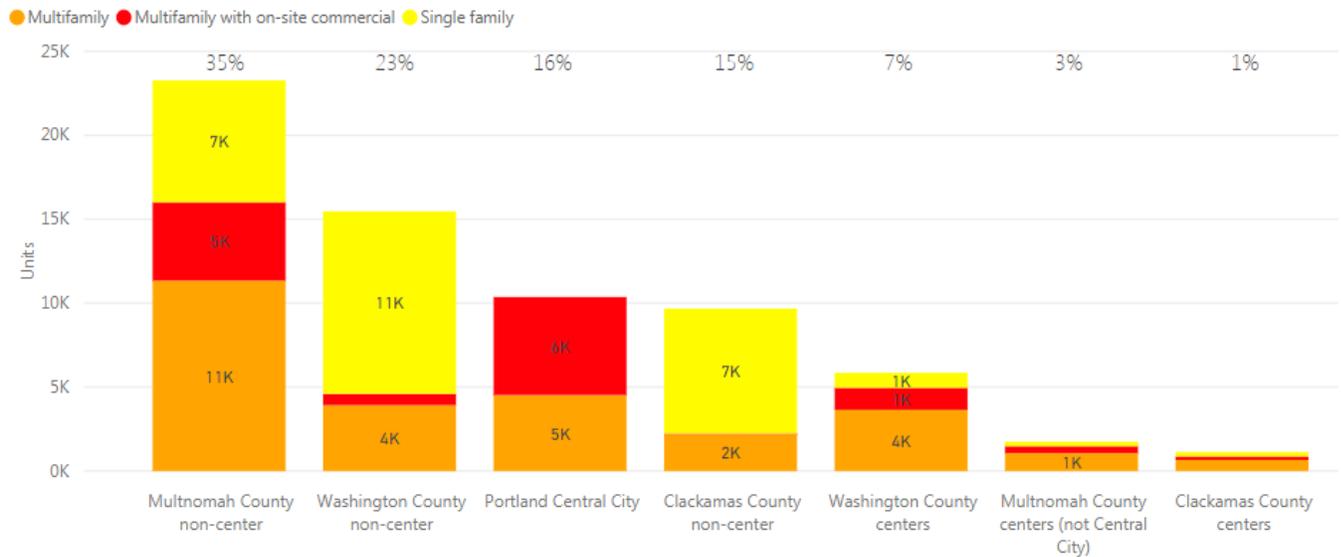


Figure 6: Units built 2007-2016 by housing type, county and 2040 Center type. Housing is divided into single-family (yellow), multifamily with on-site commercial (red) and multifamily with no on-site commercial (orange).

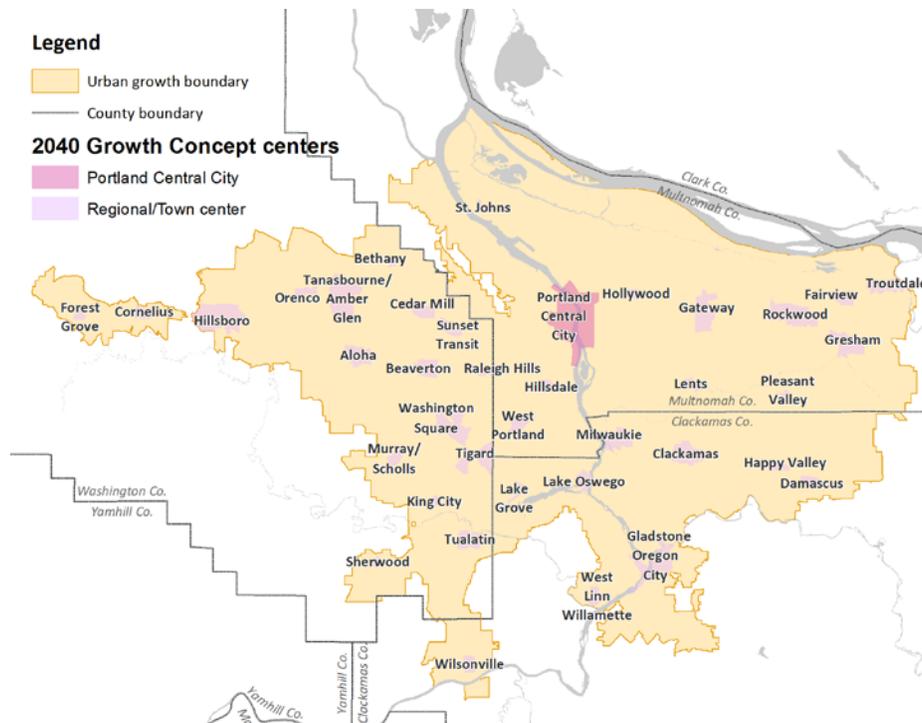


Figure 7: County boundaries and 2040 Growth Concept centers. Housing units in Figure 5 are grouped by county and by center types

- The largest number of new units built (over 23,000 units, 35% of all new units) occurred outside of 2040 centers and within Multnomah County
- New housing in Portland Central City accounted for 16% of all new units over the past 10 years (26,700 units), and were built on only 55 acres of land
- 73% of new housing inside the Urban Growth Boundary (48,400 units) were built outside of 2040 centers. The footprint of these non-center units is about 1,500 acres of land. 53% of new non-center housing units are single-family dwellings (25,600 units)
- Housing in 2040 centers not including Portland Central City made up 11% of new units (7,400 units). Multifamily housing was the major housing type in many of these centers. Only 16% of these units were single-family
- 2040 centers, including Portland Central City, makes up only 7% of the land within the Urban Growth Boundary, but saw 27% of new units built.
- Generally, 2040 centers are building more densely than outside of centers, and have very little single-family housing. However, most housing is being built outside of these centers, is less dense, and has a higher proportion of single-family homes.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

New housing as percentage increase from previous housing

Housing trends and land absorption are land use forecast metrics and are identified as a regional indicator under ORS 197.296 and 197.301

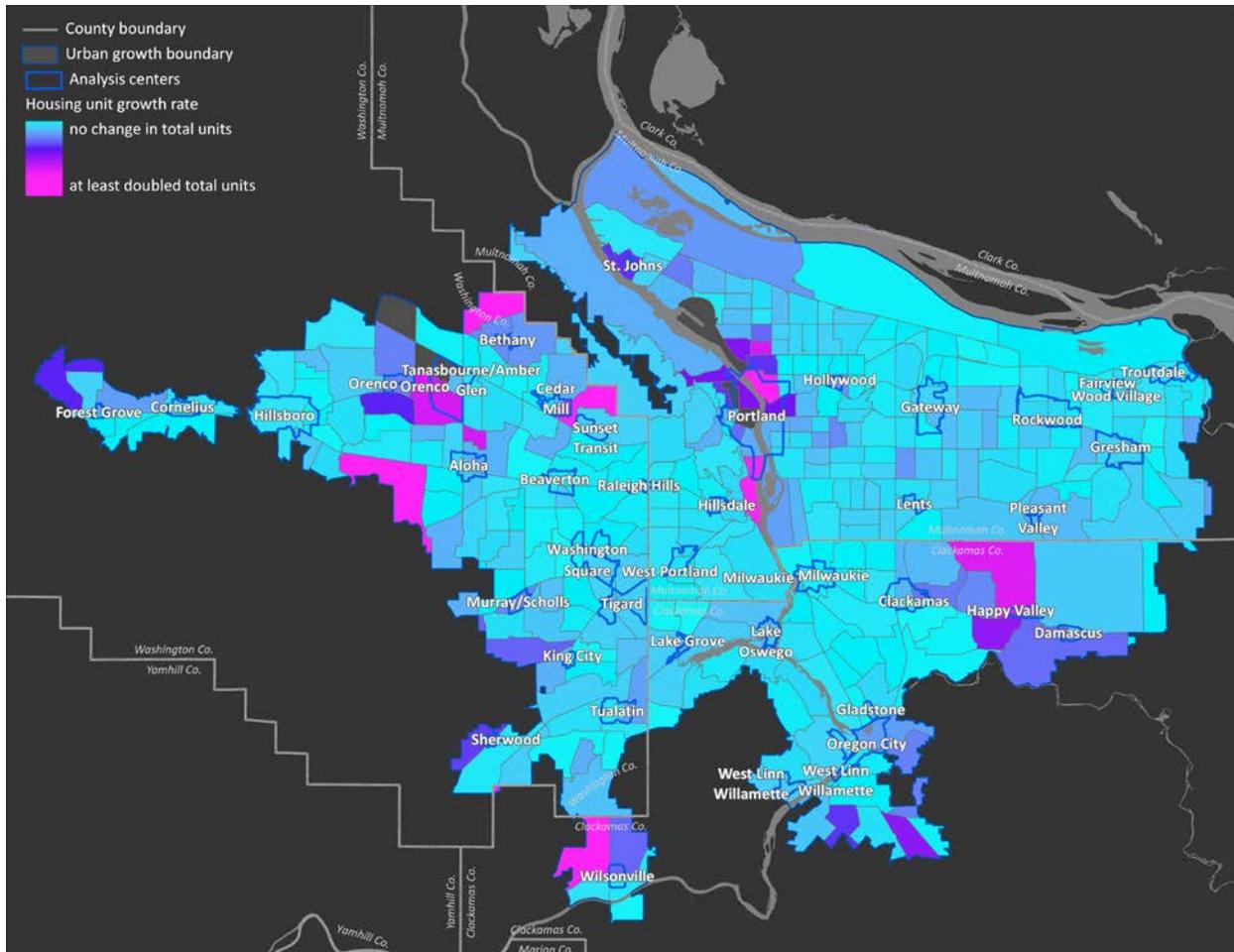


Figure 8: New units (2007-2016) per Census tract in comparison to previously existing housing units. Areas that at least doubled in total housing units appear pink, areas with little housing growth relative to total housing units appear light blue. Areas near the edge of the UGB that previously had relatively few houses like Happy Valley, west Wilsonville, SE Hillsboro and N Bethany have seen recent surges in housing construction. South Portland waterfront has seen considerable housing growth as well as inner NE Portland, where previously non-residential tracts have seen new hi-rise multifamily or mixed-use construction.

- Areas near the edge of the UGB that previously had relatively few houses like Happy Valley, west Wilsonville, SE Hillsboro and N Bethany have seen recent surges in housing construction.
- South Portland waterfront has seen considerable housing growth.
- Inner NE Portland, which has historically been non-residential, has seen new hi-rise multifamily construction, often with on-site commercial.
- North Bethany near PCC Rock Creek saw the most growth (as a percent change), over 200%, from 450 units to 1500

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

Location of recent residential construction

Housing type and number of housing units are identified as a regional indicator under ORS 197.296 and 197.301.

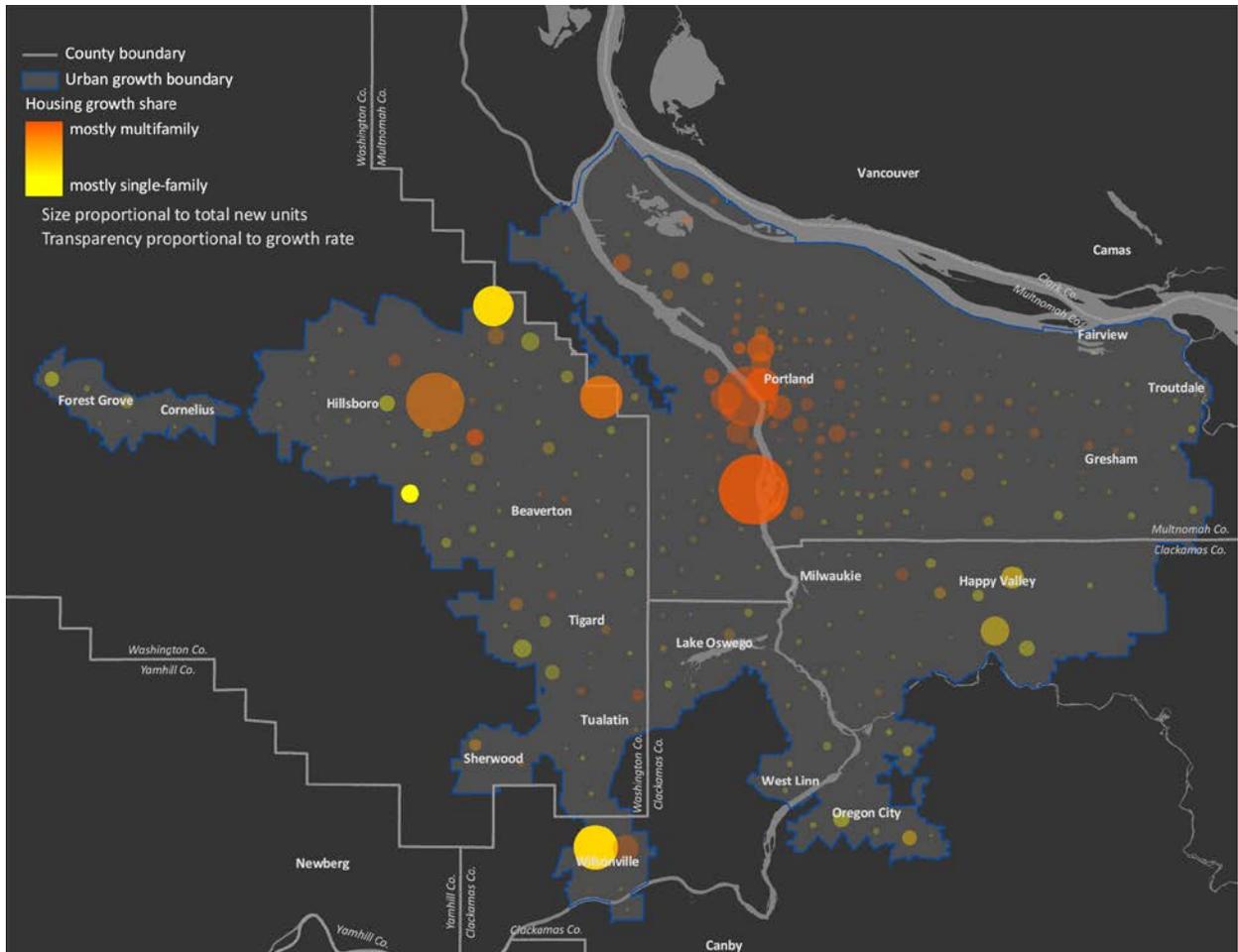


Figure 9: housing units built 2007-2016, by rzone (tract). Yellow indicates mostly SFR units, and orange indicates mostly MFR/MUR. Size of the circle is proportional to total units built (up to ~2600 new units), and transparency is proportional to the new units built compared to previous units (max growth rate is >2x new units than previously existed within tract). Suburbs like north Bethany and Wilsonville have added many new SFR units compared to total previous housing. Near the city center, there are many new multifamily units being built in areas that already had large numbers of housing units.

- Multifamily units are the primary housing type near the Portland Central Business District.
- Single family homes are much more dominant on the outer edges of the UGB.
- Large developments in Washington County include:
 - Bethany (north Washington County)
 - Orenco Station (east of downtown Hillsboro)

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

Where is commercial vs. residential development happening?

Residential and employment land are identified as a regional indicators under ORS 197.296 and 197.301.

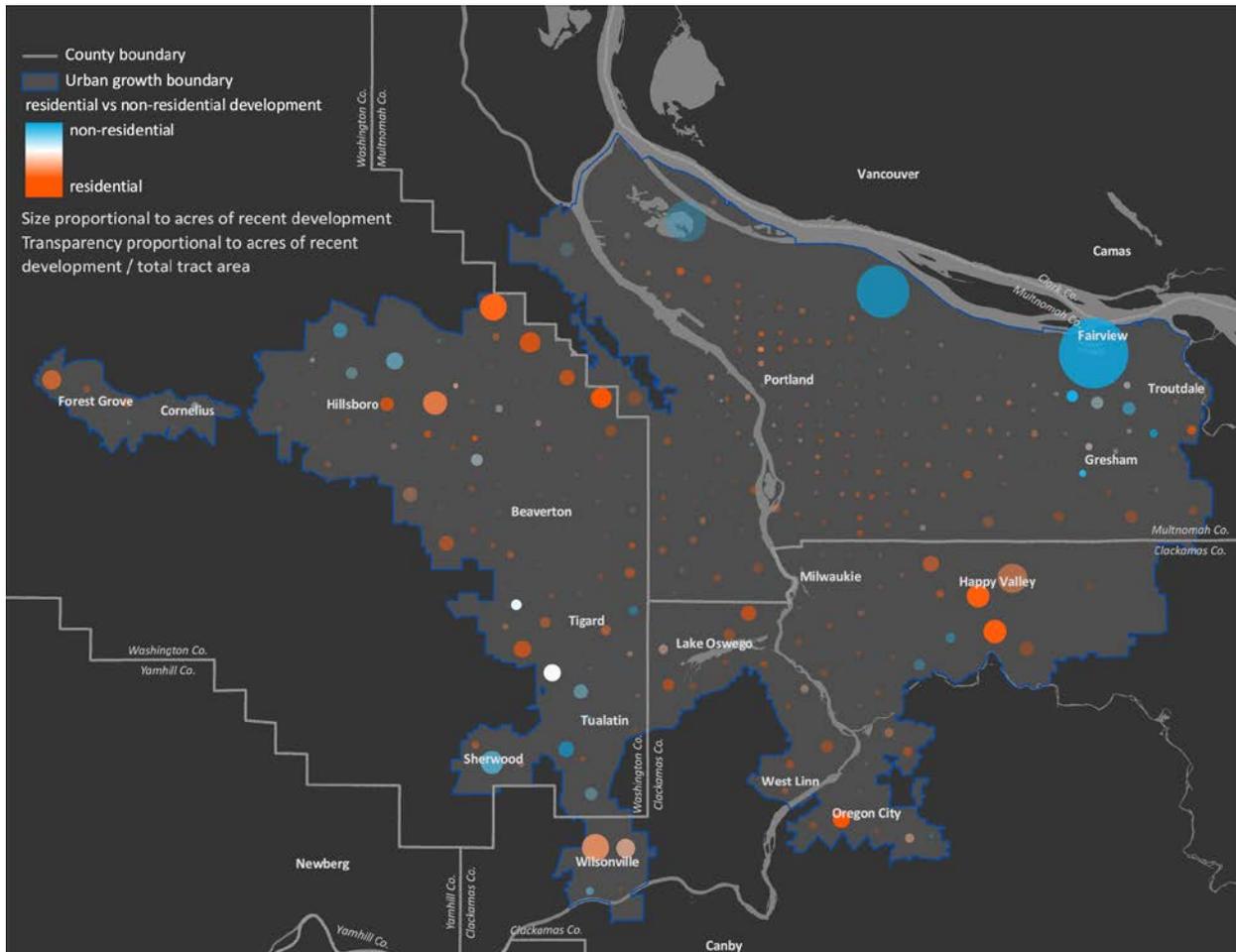


Figure 10: Type of development by tract over time period 2007-2016. Areas with mostly residential development appear orange, areas with mostly commercial development appear blue. Size indicates total acres (max = ~330 acres) of land developed, transparency indicates the acres developed in proportion to the total tract acres (opaque: >10% of tract area saw development). Bethany (west of stair-step Washington/Multnomah county boundary) and Happy Valley have seen a relatively large proportion of the small tracts develop as housing. The most acres developed within a single tract are in the industrial area along the Columbia River, where many new non-residential parcels have been developed

- The most acres of non-residential development are along the Columbia River industrial corridor.
- Other commercial centers seeing primarily non-residential development are in Tualatin/Sherwood and North Hillsboro.
- Large acreage of primarily residential development has occurred in Happy Valley and Bethany.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

Where is vacant and redevelopment land consumption happening?

Development type (vacant/infill/redevelopment) is identified as a regional indicator under ORS 197.296 and 197.301

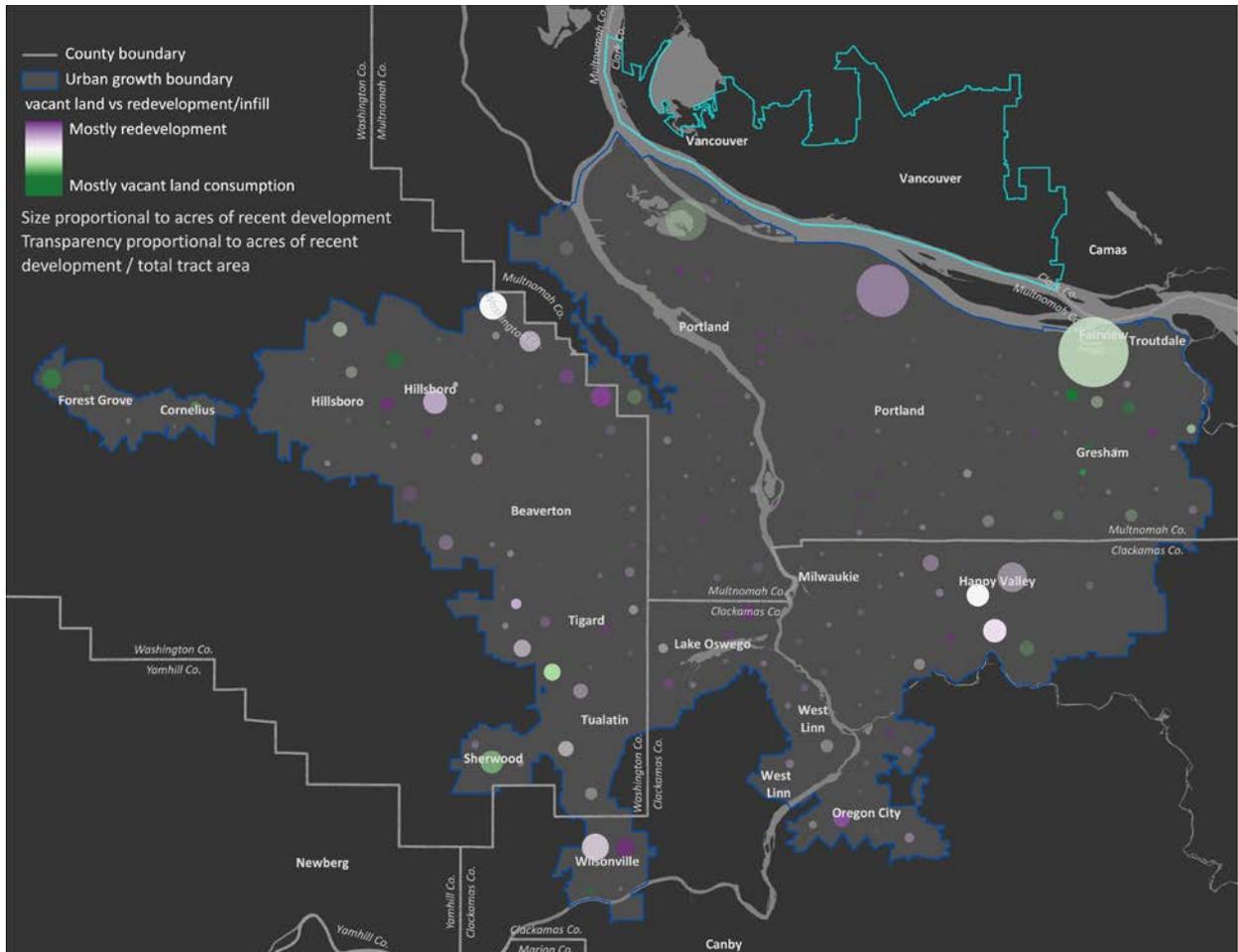


Figure 11: Share of development from 2007 to 2016 that was vacant land consumption⁶, by tract (consumption unit=acres). Green areas indicate recent development was mostly vacant land consumption. Purple indicates recent development was mostly redevelopment or infill. White is a mix of vacant land consumption and redevelopment/infill. Size indicates total acres (max = ~330 acres) of land developed, transparency indicates the acres developed in proportion to the total tract acres (opaque: >10% of tract area saw development). Tracts where most development was vacant land consumption lie near the edges of the region.

- See sections further below for data on production of actual housing units and employment sites; this metric addresses land consumption for all purposes by acreage consumed. This data in conjunction with the housing unit production data show that the region is making more efficient use of land overall
- Largest dots are near edge of region- more total acres affected near outer edges of UGB

⁶ Vacant Land Consumption defined here as in BLI: the parent lot (lot before division or development) was at least 5% developed according to Vacant Land Inventory in the base year (2002 for this study). Many rural lots are 5% or more developed, and when subdivided for new housing qualify as infill/redevelopment rather than vacant land consumption under this definition.

- While many housing units are being built around downtown Portland (Figure 8), they have a relatively small footprint compared to the total acres developed in tracts near the edges of the UGB
- Most areas had a mix of vacant land consumption, but many interior tracts had a lower share of vacant land consumption, because there is less vacant land to develop.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

Relative contribution of vacant land and already-built lands to housing production

Development type (vacant/infill/redevelopment) is identified as a regional indicator under ORS 197.296 and 197.301

New units built by year and development type

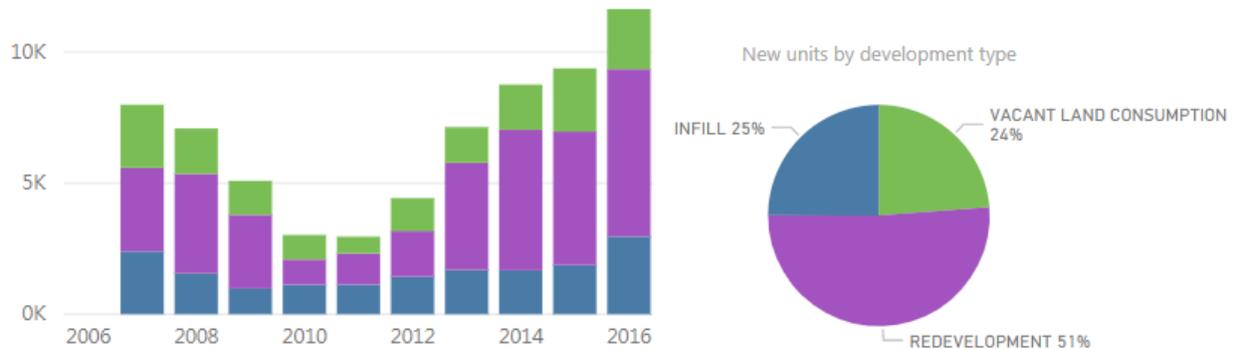


Figure 12: Share of new housing units built of each development type for each year (left) and cumulative over past 10 years (right). Overall, redevelopment makes up the largest share of new units built (>50%), while vacant land consumption is the smallest at <25%.

- Development of residential units on vacant land is trending to be a smaller part contributing to the total number of units built – less than 25%
- Redevelopment was the most affected by the recession (i.e., saw the greatest reduction in units built) – this is consistent with building permit data indicating that redevelopment, being multifamily type, fluctuates more with market cycles and general economic activity than vacant land development.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

- Vacant Land Consumption defined here as in BLI: the parent lot (lot before division or development) was $\leq 5\%$ developed according to Vacant Land Inventory in the base year (2002 for this study). Many rural lots are 5% or more developed, and when subdivided for new housing qualify as infill rather than vacant land consumption under this definition.

Land consumption shares by development type

Development type (vacant/infill/redevelopment) is identified as a regional indicator under ORS 197.296 and 197.301



Figure 13: Acres of land developed by development type over past 10 years (left) and by year (right). Development includes all residential development plus commercial and industrial. Infill, redevelopment and vacant land consumption are nearly equal shares of overall development in the past decade. Vacant land consumption pre-recession was a larger share than it has been in more recent years.

- Given the larger contribution of infill and redevelopment to total housing units produced (see previous page) the region is making more efficient use of residential land.
- Vacant land consumption still remains a large component contributing to new residential, commercial and industrial production.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

- Vacant Land Consumption defined here as in BLI: the parent lot (lot before division or development) was <=5% developed according to Vacant Land Inventory in the base year (2002 for this study). Many rural lots are 5% or more developed, and when subdivided for new housing qualify as infill rather than vacant land consumption under this definition.

Share of new housing by development type

Development type (vacant/infill/redevelopment) is identified as a regional indicator under ORS 197.296 and 197.301

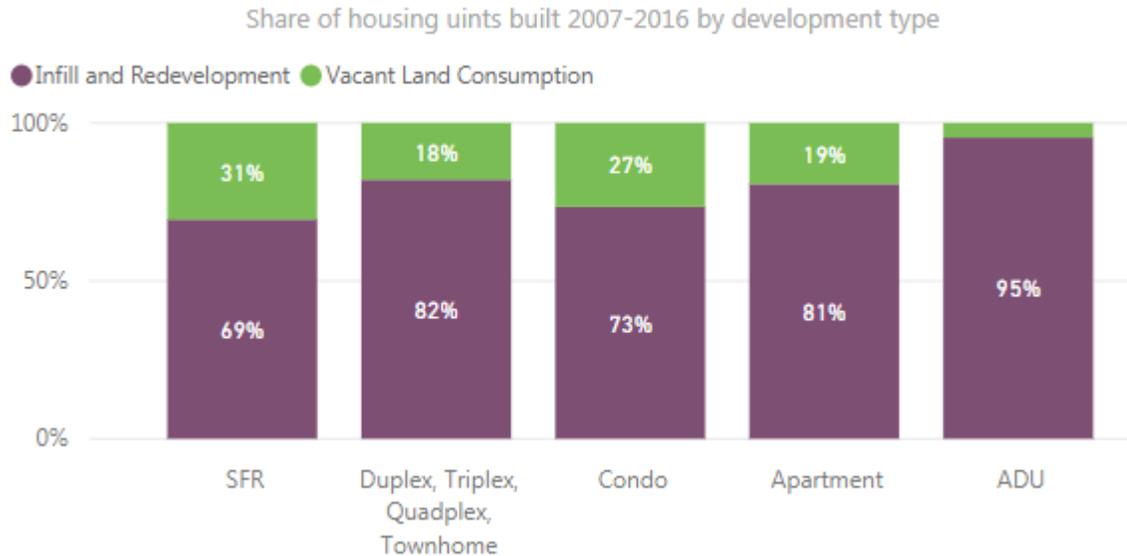


Figure 14: Share of new units built between 2007 and 2016 classified as vacant land consumption vs. infill/redevelopment.

Recent housing production trends in the Metro UGB:

- 69% of single-family (SFR) production over the past decade has come through as infill development. (See “data source” note below for this explanation)
- 31% of new single-family homes were built on vacant land
- Production of so-called “middle-housing” (i.e., duplex, triplex, etc) has mostly occurred through redevelopment
- Most ADUs are built on lots that already contains an existing single family structure and are therefore already considered developed – therefore very few ADUs are categorized as construction on vacant land
- A majority of multifamily (i.e., apartment) production was built on land that has been redeveloped
- Regional homebuilders have turned to residential infill and redevelopment to produce needed housing as production on vacant land has diminished.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

- Vacant Land Consumption defined here as in BLI: the parent lot (lot before division or development) was $\leq 5\%$ developed according to Vacant Land Inventory in the base year (2002 for this study). Many rural lots are 5% or more developed, and when subdivided for new housing qualify as infill rather than vacant land consumption under this definition.

Multifamily construction trends

Housing types are identified as a regional indicator under ORS 197.296 and 197.301

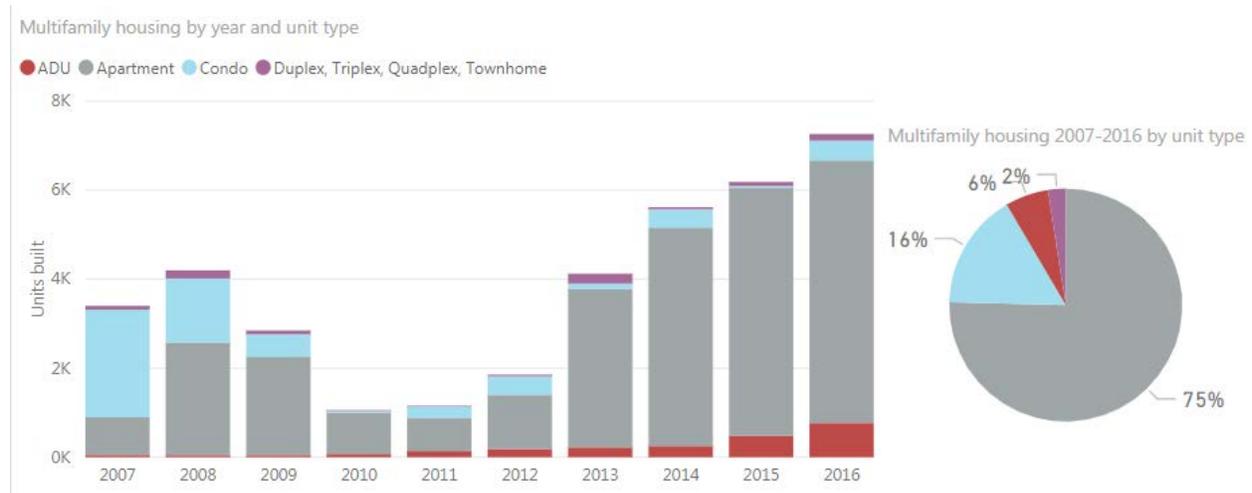


Figure 15: Multifamily housing types⁷ built 2007-2016 by year (left) and cumulative (right). Apartments make up the largest share of multifamily housing overall. Construction of multifamily housing slowed during the recession. Condominium unit construction has not rebounded in recent years the same way that apartment construction has. Accessory Dwelling Units (ADUs) are a growing share of multifamily housing.

Recent multifamily housing production trends in the Metro UGB:

- Apartments make up the largest share (75%) of multifamily housing overall.
- Construction of multifamily housing slowed after the Great Recession. The lagged effect was because there were projects already in the production pipeline, but financing new projects in the immediate aftermath of the recession had diminished sharply due to the collapse in the real estate and financial sectors of the U.S. economy.
- Condominium unit construction has not rebounded in recent years the same way that apartment construction has.
- Accessory dwelling units (ADUs) are a growing share of regional housing, which may have been spurred by City of Portland's waiver of system development charges. The City of Portland recently extended the waiver in perpetuity.
- Multifamily housing, specifically apartments, have overtaken single-family production in the past few years. This maybe a near-term cyclical response to catch-up to dearth of apartment construction in the aftermath of the Great Recession.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

⁷ Multifamily housing from RLIS multifamily housing inventory, defined as any taxlot with more than one housing unit. This graph not inclusive of group quarters, manufactured homes and unclassified unit types included in database

Accessory dwelling unit construction trends

Housing types are identified as a regional indicator under ORS 197.296 and 197.301

ADU units by year

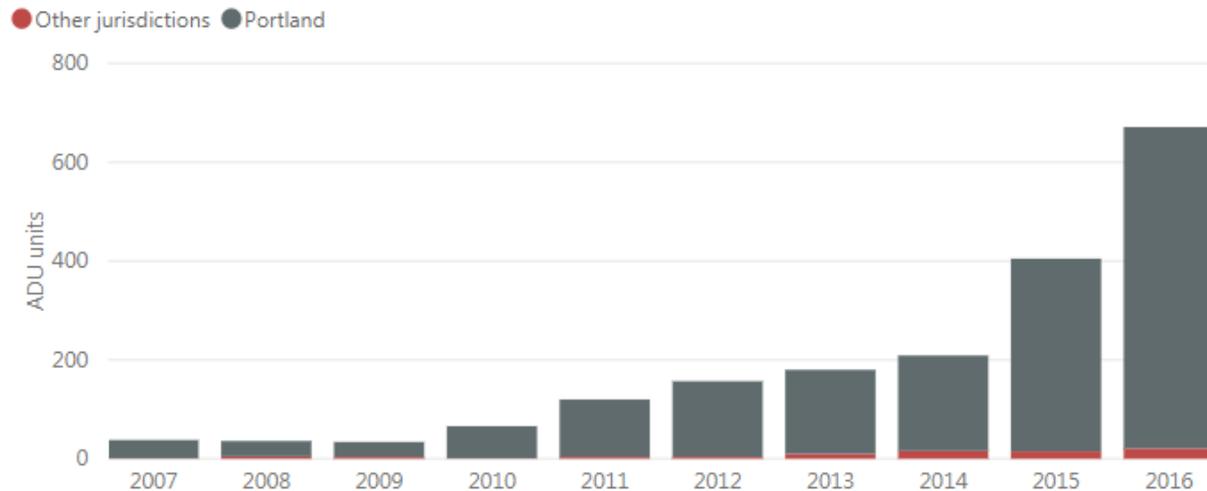


Figure 16: Accessory dwelling unit construction over time.

ADU development trends – facts and figures:

- ADUs make up about 7% of regional housing units built in 2016
- ADUs are about 0.5% of all housing in the region
- 98% of ADUs are within the city of Portland
- 2% of single family homes within Portland have an ADU
- Recently passed state and local legislation made ADU construction easier and less costly
- It is unclear what proportion of new ADUs should be counted as a long-term regional housing solution because surveys indicate that some are being used in day-to-day room rentals or leases (e.g., AirBnB).

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

- Data primarily reflects permitted, legal ADUs, identified either by an official address or an approved permit.

Condominium construction trend

Housing types are identified as a regional indicator under ORS 197.296 and 197.301

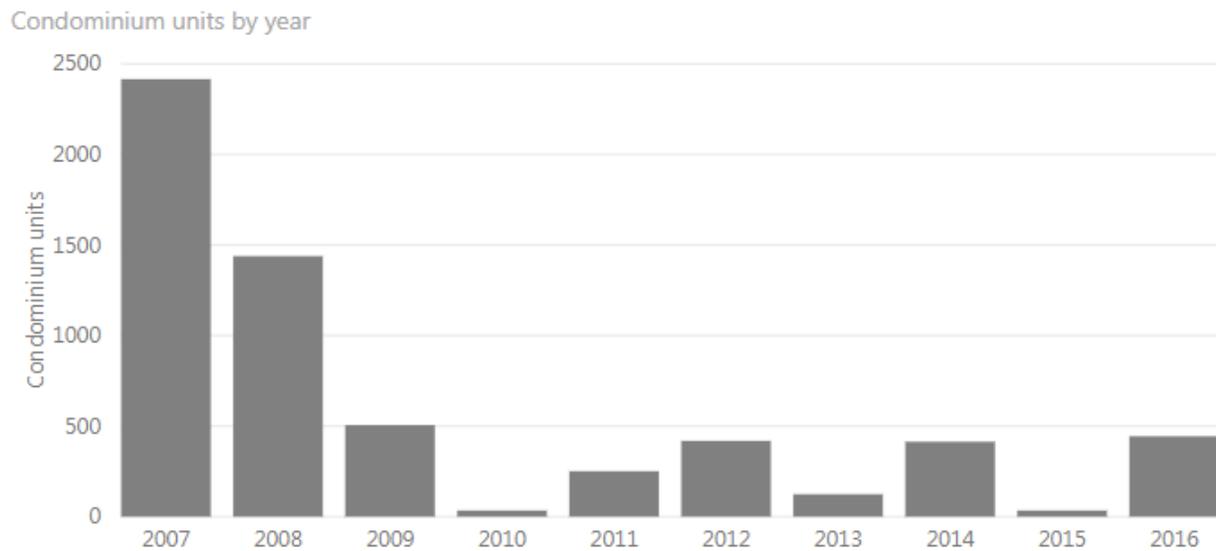


Figure 17: Condominium construction over time

Condo development trends:

- Condominium construction fell sharply during the Great Recession, and has not recovered.
- Condominiums make up about 6% of all housing forms in the region
- Condos made up 30% of all regional housing units built in 2007, but less than 1% of units built in 2015 and only 4% of units in 2016.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

Apartment construction trend

Housing types are identified as a regional indicator under ORS 197.296 and 197.301

Apartment units by year

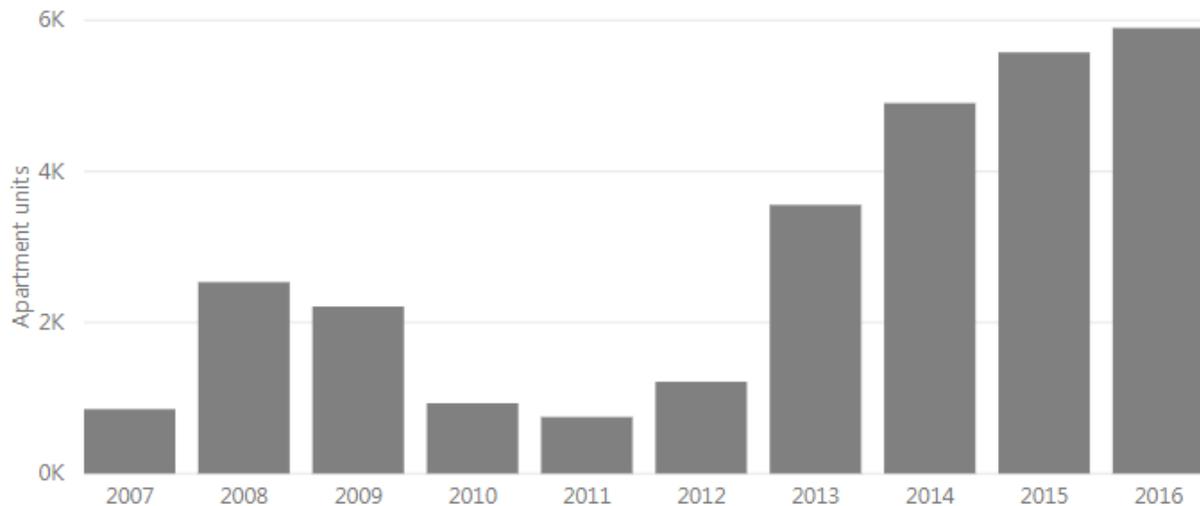


Figure 18: New apartment units built 2007-2016

Recent apartment construction trends in the Metro UGB:

- The total inventory of existing apartment units within the UGB makes up 28% of the regional housing stock, but accounts for about 7% of the residential land area of the region.
- Apartments make up 44% of new housing production over the past decade, but covered less than 10% of residential acres consumed over that period
- Apartments have become the most-built housing type since the Great Recession, almost twice that of single-family construction in 2015 and 2016 – historically the reverse has been the case.

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

Multifamily < 5 units (quadplex, triplex, duplex, townhome)

Housing types are identified as a regional indicator under ORS 197.296 and 197.301

small multifamily housing construction by type

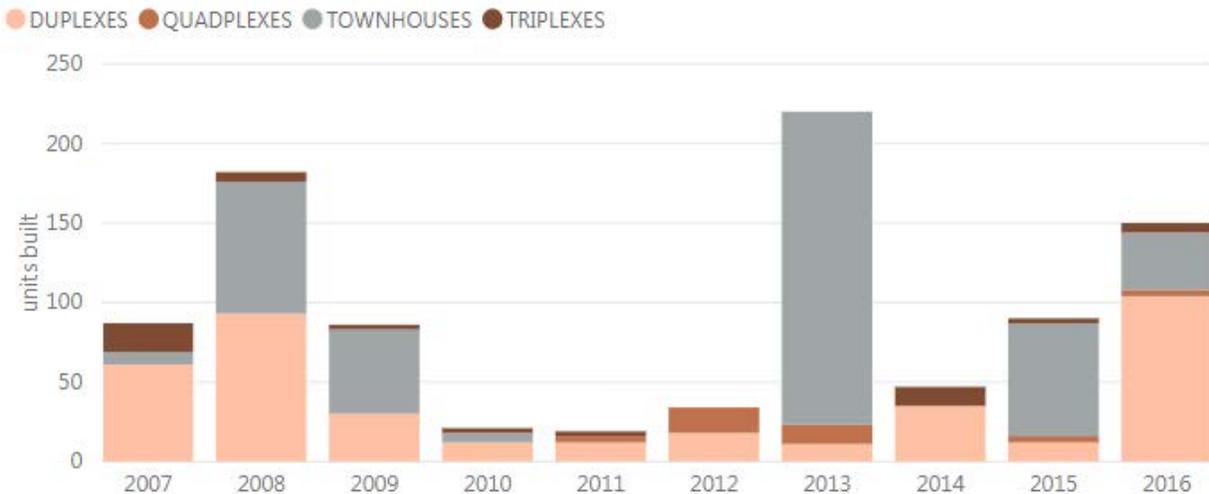


Figure 19: New small multifamily housing (<5 units) constructed 2007-2016 by housing type. Housing types as defined in RLIS multifamily housing inventory⁸

Recent “middle housing” trends:

- Less than 4% of all current housing within the UGB is middle housing (multifamily housing complexes under 5 units), and less than 2% of all current residential land
- Multifamily housing complexes under 5 units collectively make up 1% of housing units and fewer than 1% of residential land built between 2007-2016
- The share of duplexes, triplexes, quadplexes and townhomes built in a given year has been highly cyclical

Data sources:

Land Development Monitoring System output dataset, from May 2018 RLIS data input

⁸ Townhomes in the RLIS multifamily housing inventory only include townhome-style construction with more than one unit built on a single lot. Other townhome-style housing (attached walls, each on their own lot) is considered single-family under these definitions.

Single-family construction trends

Housing types are identified as a regional indicator under ORS 197.296 and 197.301

Single-family home construction by year

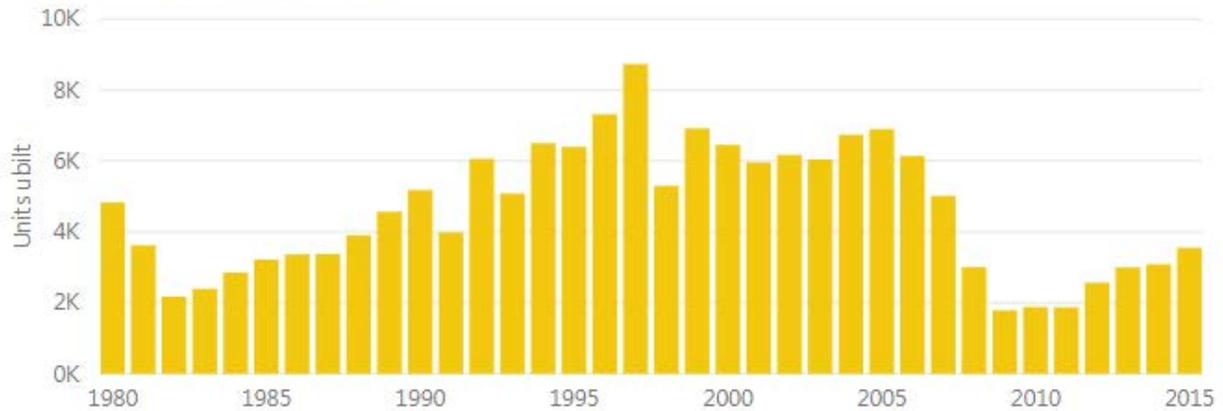


Figure 20: New single-family homes by year.

Single family housing production trends:

- Single family homes make up 56% of the total housing units within the UGB, and cover 84% of total residential land
- Single family homes supplied 42% of housing units occupying 77% of residential land consumed between 2007-2016
- While total housing unit production has recovered to pre-recession peaks, single family production levels have not fully recovered (see chart above).

Data sources:

RLIS Single-family housing database, filtered to exclude large rural and agricultural lots. Extent of data is tri-county. Data includes current, existing homes only- any homes built during the time period but not existing today (e.g. redeveloped to apartments, or lost in fire, etc.) are not included in the database.

Density of single-family housing

Lot size and development density are identified as a regional indicator under ORS 197.296 and 197.301

Comparison of lot and building size over time



Figure 21: Single-family lot (black line) and building (green line) size, from median values by year built.

Size trends of single family houses and tax lots:

- Median single-family lot size has decreased from 8,300 square feet in 1980 to 4,400 square feet in 2016.
- Median size of a single-family home has increased from around 1,600 square feet in 1980 to 2,400 square feet in 2016.
- In general, new single family homes have been growing progressively larger, but these newer houses are being built on steadily smaller lots.

Data sources:

RLIS Single-family housing database, filtered to exclude large rural and agricultural lots. Extent of data is tri-county. Data includes current, existing homes only- any homes built during the time period but not existing today (e.g. redeveloped to apartments, or lost in fire, etc.) are not included in the database.

Family households

Family households⁹ represent about two-thirds of regionwide households. Millennial-aged residents are approaching the life-cycle stage in which many will be forming families for the first time. This indicator provides contextual information relevant to indicators called for in ORS 197.296 and 197.301 (type of residential units)

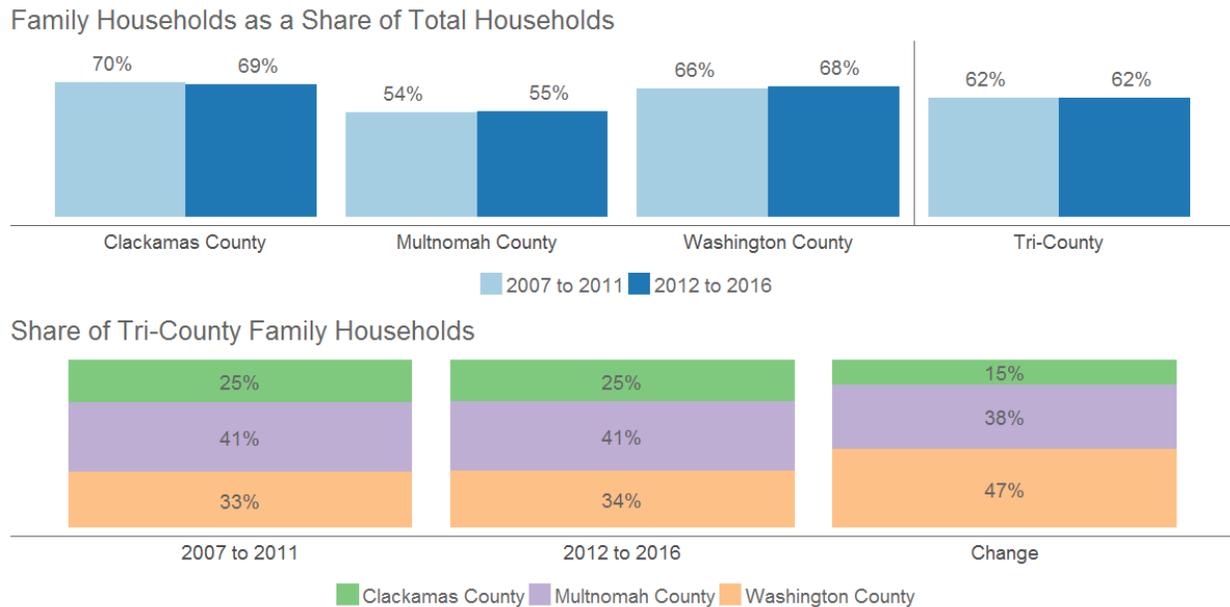


Figure 1: Family households in Clackamas, Multnomah, and Washington counties

- Multnomah County (55%) has significantly fewer family households as a share of total households than Clackamas County (69%) or Washington County (68%).
- Overall, little change occurred in per-county or regional family households as shares of total households, but this may swiftly change as millennials grow into adulthood and begin setting down roots in the community, including buying homes and raising children.
- Small increases in shares of family households occurred in Multnomah and Washington counties, and a small decrease occurred in Clackamas County.

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP02; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

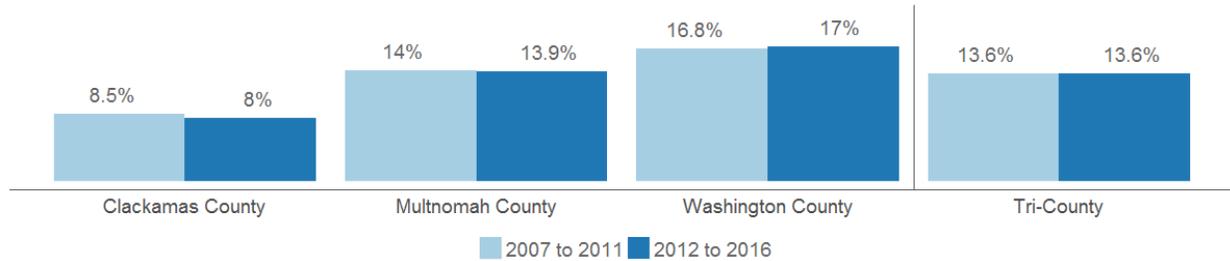
U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP02; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

⁹ U.S. Census defines a Family Household as a group of two people or more (one of whom is the householder) related by birth, marriage, or adoption and residing together.

Foreign born population

Diversity, equity and inclusion are cornerstone values in Metro policy. This information helps provide contextual information that may inform other policies of metropolitan concern.

Foreign Born Population as a Share of Total Population



Share of Tri-County Foreign Born Population

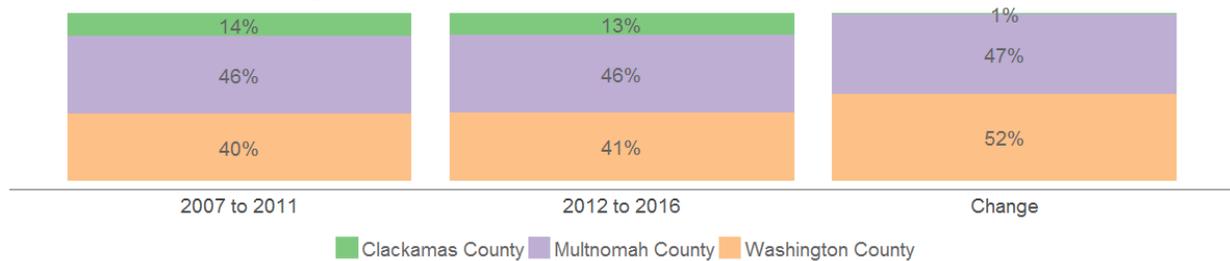


Figure 1: Foreign born in Clackamas, Multnomah, and Washington counties

- Although a regional increase of approximately 14,000 foreign born occurred between 2007-2011 and 2012-2016, the relative shares of each county remained about the same.
- Clackamas County represents approximately 13% of the region’s foreign born population, but saw only 1% of the regional growth.
- Washington County, on the other hand, represents about 41% of the region’s foreign born population, but saw a disproportionate 52% of the regional growth.

Data sources:

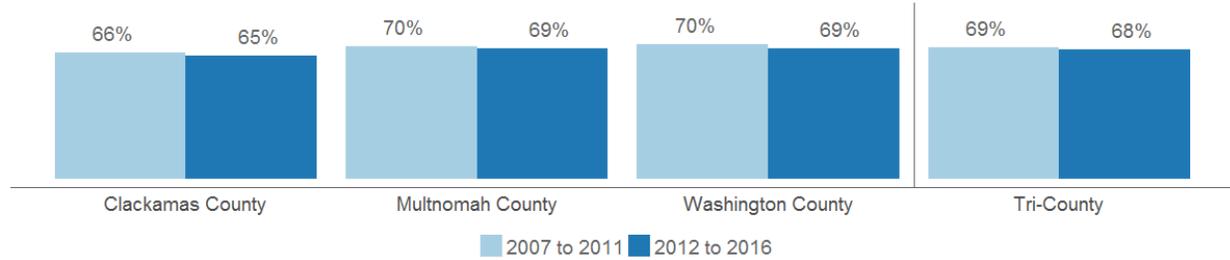
U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP02; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP02; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Labor force

Labor force is identified as a regional indicator under ORS 197.296 (economic trends/cycles). Labor force participation rates have been declining for a long time. Arresting this trend would promote greater economic opportunities and raise prosperity in the region. This data provides information about the size of the region’s labor supply.

Labor Force as a Share of Population 16 Years and Over



Share of Tri-County Labor Force

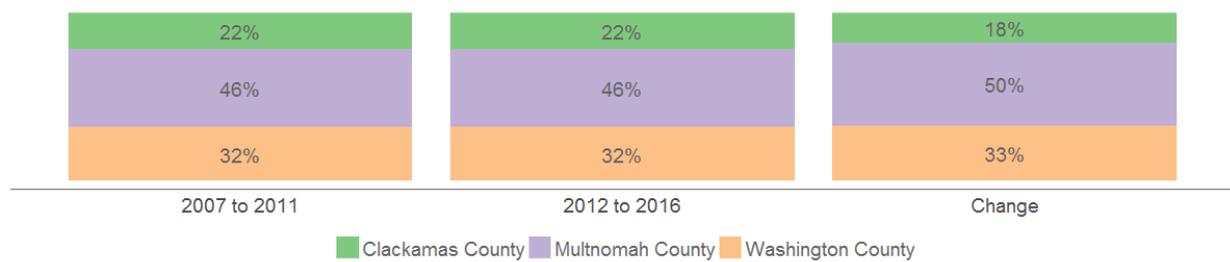


Figure 1: Housing Units in Clackamas, Multnomah, and Washington counties

- Approximately 68% of the population 16 years and over in the Tri-County region is in the labor force, and per-county shares are similar for Clackamas, Multnomah, and Washington counties (65%, 69%, and 69% respectively).
- Despite increases in total numbers, very little change occurred in terms of per-county shares.
- Multnomah County is home to 46% of the Tri-County regional labor force.

Data sources:

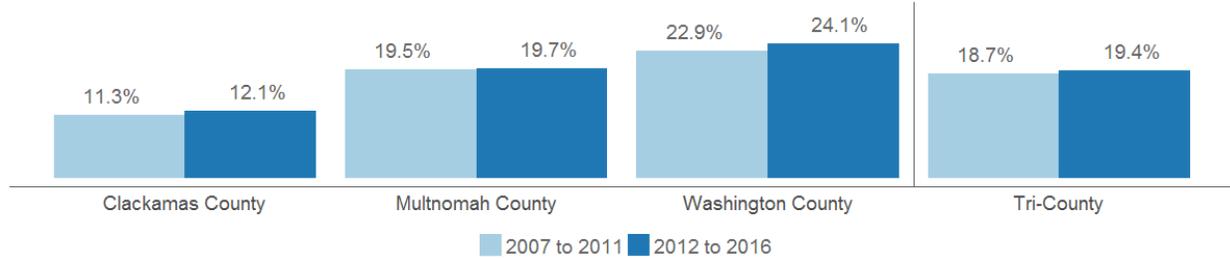
U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP03; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP03; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Non-English speaking population

Diversity, equity and inclusion are cornerstone values in Metro policy. This information helps provide contextual information that informs policy makers. Non-English speaking population information provides background information on reaching out to non-native speakers.

Non-English Speaking Population as a Share of Population 5 Years and Over



Share of Tri-County Non-English Speaking Population

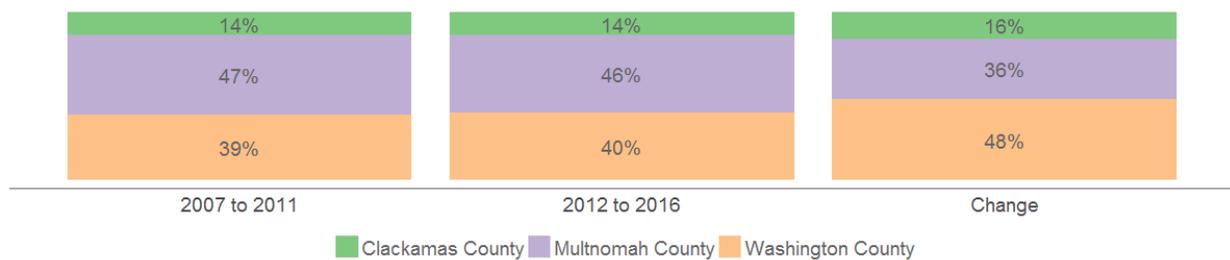


Figure 1: Non-English speaking in Clackamas, Multnomah, and Washington counties

- The Tri-County region experienced an approximate 0.7 percentage point increase in Non-English speaking population¹⁰.
- The greatest per-county increases were seen in Clackamas and Washington counties (0.8 and 1.2 percentage point increases respectively), with a very small increase in Multnomah County
- Multnomah County represents 46% of Non-English speakers in the Tri-County region, but only 36% of the regional increase.

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP02; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

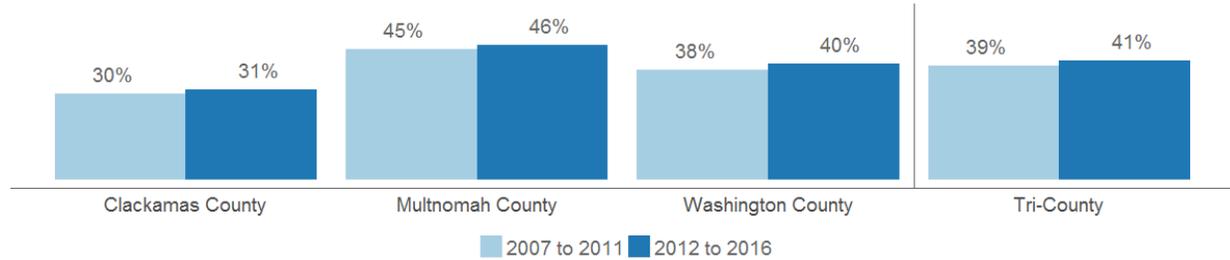
U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP02; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

¹⁰ Non-English speaking is defined here as those who speak a language other than English at home.

Renter-occupied units

Renter-occupied units are identified as a regional indicator under ORS 197.296.

Renter-Occupied Units as a Share of Occupied Housing Units



Share of Tri-County Renter-Occupied Units

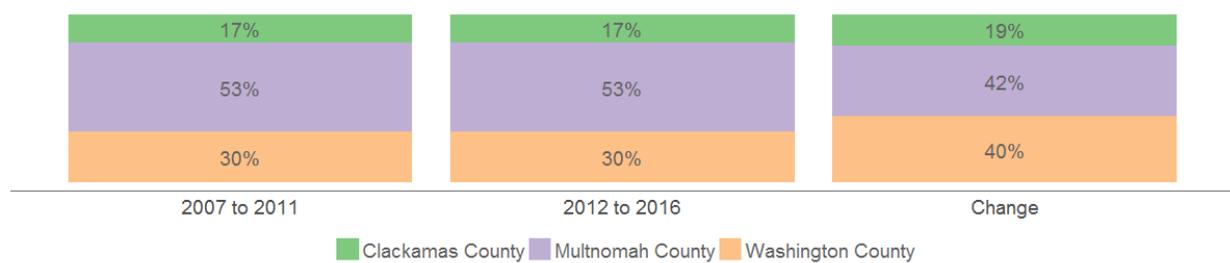


Figure 1: Renter-occupied units in Clackamas, Multnomah, and Washington counties

- The shares of renter-occupied units slightly increased across all counties by approximately 1 to 2 percentage points, and in the Tri-County region overall by 2 percentage points.
- Despite only representing 30% of regional renter-occupied units, Washington County represented 40% of the regional increase in renter-occupied units.
- The slight increase in renter-occupied units did not materially affect the proportional Tri-County distribution. Multnomah County still represents the majority of renter-occupied units in the region.

Data sources:

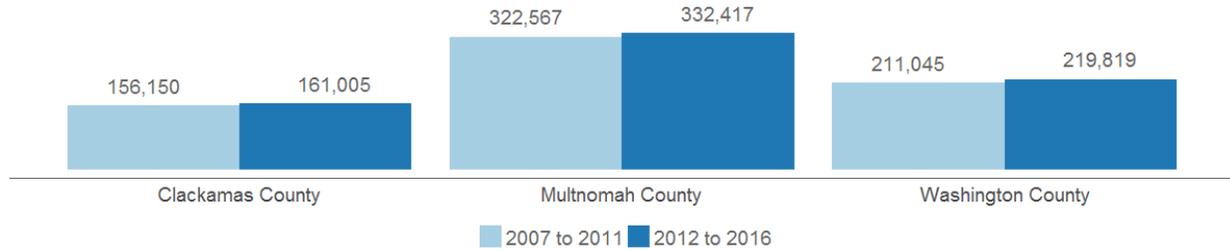
U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Residential units

Number of residential units is identified as a regional indicator under ORS 197.296

Total Residential Units



Share of Tri-County Residential Units

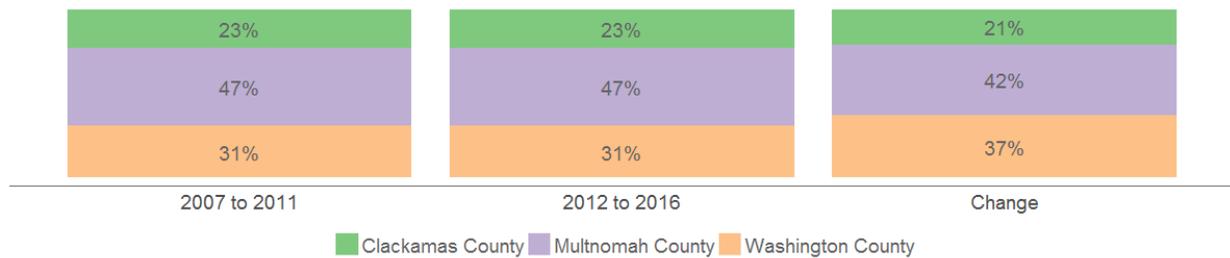


Figure 1: Housing Units in Clackamas, Multnomah, and Washington counties

- There are currently 713,241 residential housing units in the Tri-County region, of which Clackamas, Multnomah, and Washington counties represent approximately 23%, 47%, and 31% respectively.
- Residential units have increased by approximately 23,479 in the Tri-County region since the 2007-2011 time period, of which total Clackamas, Multnomah, and Washington counties supplied approximately 21%, 42%, and 37% respectively.
- Housing production had been abnormally low during the Great Recession, but production has ramped up sharply and now stands at almost 17,000 units, annualized (Census, Mar. 2018)

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Residential vacancy rates

Residential vacancy rates are identified as a regional indicator under ORS 197.301

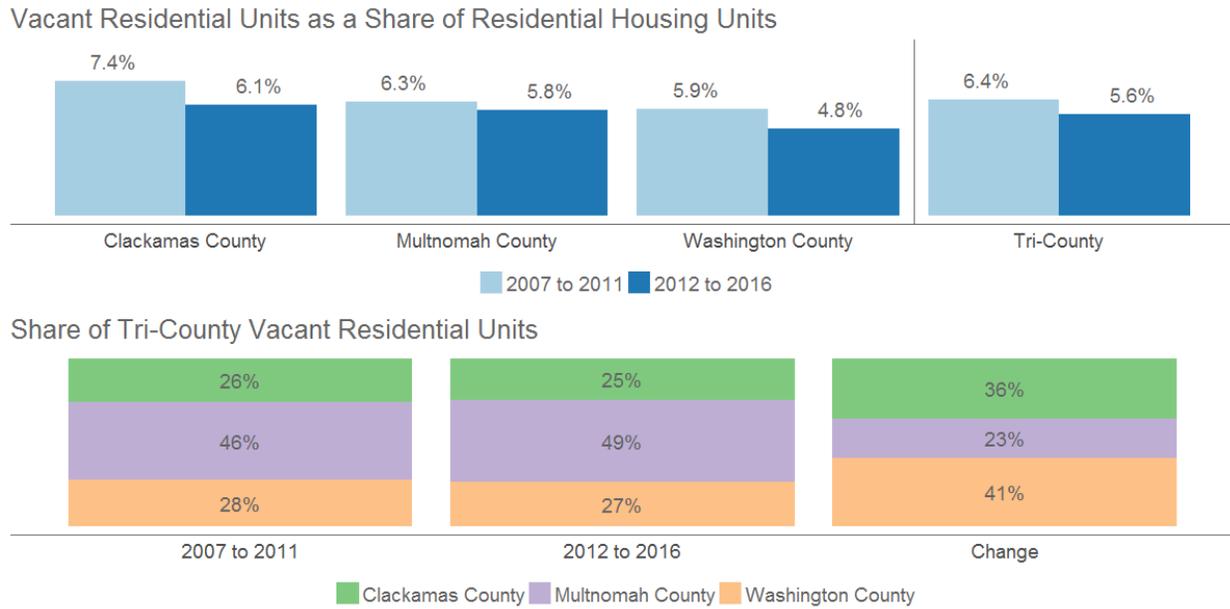


Figure 1: Residential vacancy rates in Clackamas, Multnomah, and Washington counties

- Residential vacancy rates declined in Clackamas, Multnomah, and Washington counties by approximately 1.3, 0.5, and 1.1 percentage points respectively, which represents an overall Tri-County decrease of 0.8 percentage points or 28,235 vacant residential units.
- Washington and Clackamas counties saw its share of vacant units decline during the period, while the Multnomah County share of vacant units rose.
- Multnomah County has seen its share of vacant units rise from 46% to 49% of Tri-County vacant residential units.

Data sources:

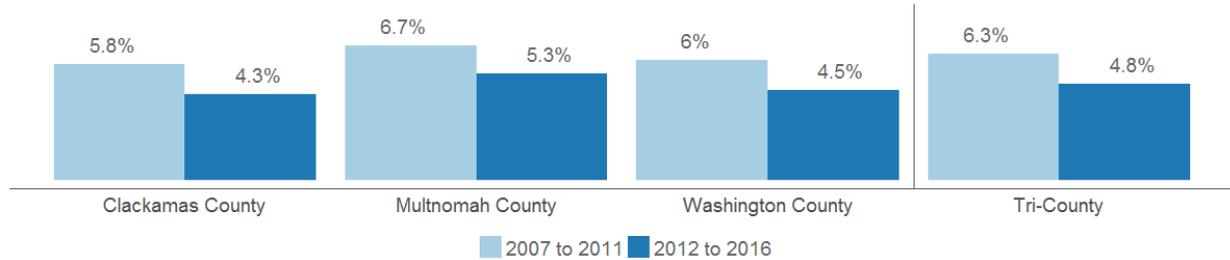
U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Unemployment

Unemployment is identified as a regional indicator under ORS 197.296 and ORS 197.301 (economic trends/cycles and job creation). The unemployment rate is one of the broadest indicators of employment growth and economic vitality of the region.

Unemployed as a Share of Population 16 Years and Over



Share of Tri-County Unemployed

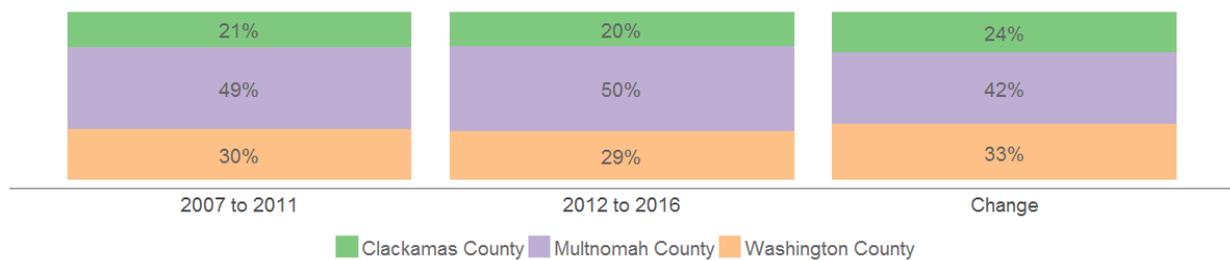


Figure 1: Unemployment in Clackamas, Multnomah, and Washington counties

- Since the close of the Great Recession, employment growth in the region has outpaced the national growth rate by 2 to 1.
- The unemployment rate indicates the region is either near or at full employment.
- Employment is unlikely to grow any faster not because the region is facing specific economic headwinds, but rather the labor force is unable to keep pace with employment demand.
- The even decline in the unemployment rate in each county indicates the economy has been strong in suburban and urban areas in equal proportions. This has not been the case in prior economic recoveries in which suburban counties have generally fared better.

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP03; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP03; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Average household size by tenure

Tenure choice and household size trends are indicative of economic and demographic trends, housing trends and development policies. ORS 197.296 and 197.301 reference reporting on such trends and performance indicators.

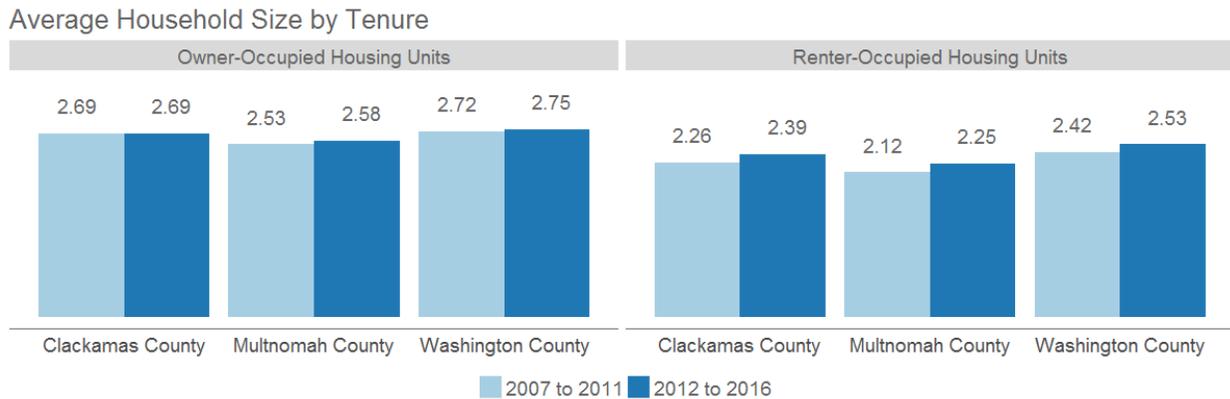


Figure 1: Average household size by tenure in Clackamas, Multnomah, and Washington counties

- Average household size for owners has increased slightly in Multnomah and Washington counties (0.05 and 0.03 persons per housing unit respectively).
- Average household size for renters has increased more significantly than for owners – by 0.11 to 0.13 persons per housing unit in each of the three counties. Increases for renter household sizes may be due to increases in family sizes and shares of family households, as well as shares of cost-burdened renters (e.g., non-family roommates).

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP02; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP02; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Median Value for owner-occupied units

Housing values are indicative of real estate trends. As such they provide a “shadow price” indication of vacant land value¹¹ (per ORS 197.301).

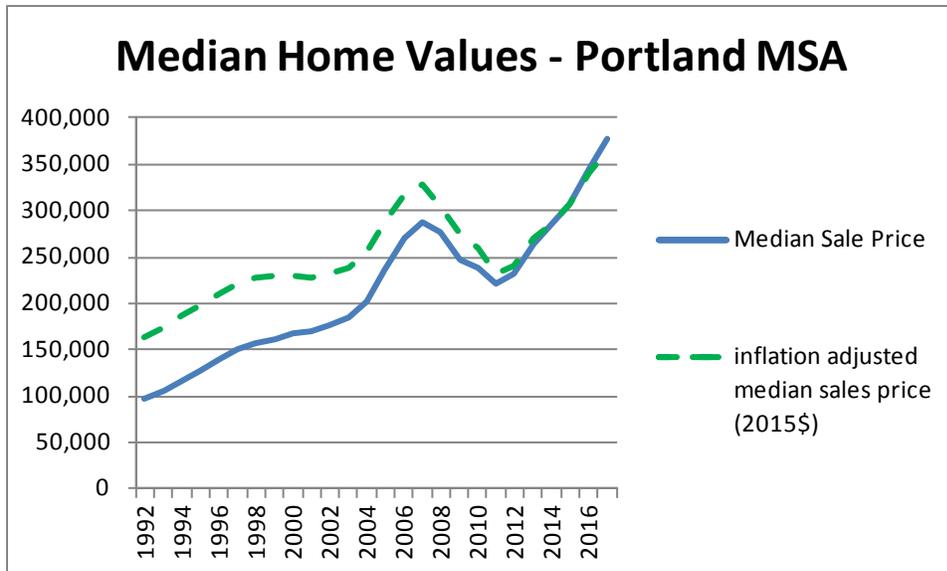


Figure 1: Median owner-occupied home value in Clackamas, Multnomah, and Washington counties

Table 1: Annual Percent Change in Median Home Sale Price (RMLS)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Ann. % chg.	-10.3%	-5.2%	-10.4%	3.3%	12.2%	6.3%	6.9%	11.2%	7.3%

Table 2: Annual Percent Change in U.S. Consumer Price Index (Bureau of Labor Statistics)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Ann. % chg.	-0.4%	-1.6%	-3.2%	2.1%	1.5%	1.6%	0.1%	1.3%	2.1%

- Both nominal and inflation adjusted sales price of owner-occupied homes indicate a strong rebound in home values since the Great Recession.
- Median home prices have accelerated faster than overall consumer inflation rates in the U.S.

Data sources:

Realtors Multiple Listing Service (RMLS)

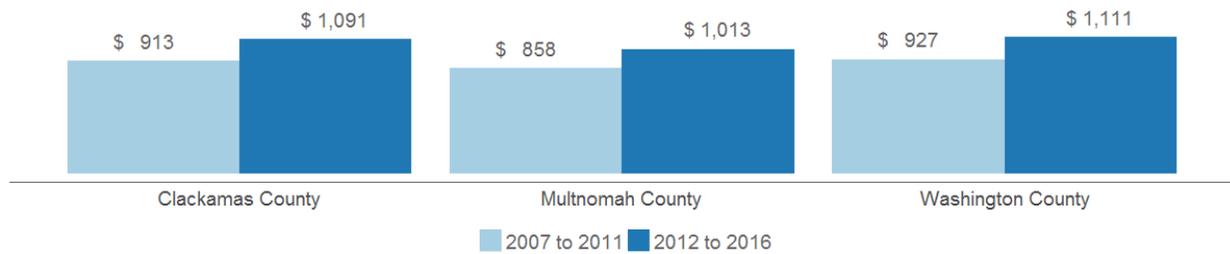
(Inflation adjusted figures used the U.S. CPI all items index to convert nominal home prices into real prices.)

¹¹ Vacant land sales price is difficult to accurately measure because the number of transactions are few and many are not independent arms length sales.

Median Gross Rent

Apartment rents are indicative of real estate trends. As such they provide a “shadow price” indication of vacant land value¹² (per ORS 197.301).

Median Gross Rent



Inflation-Adjusted

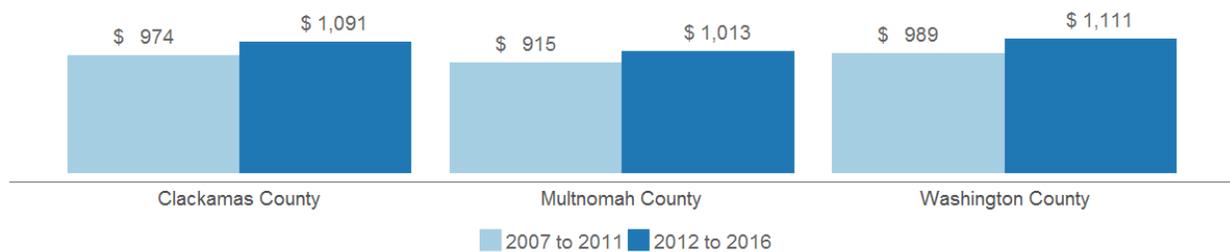


Figure 1: Median gross rents in Clackamas, Multnomah, and Washington counties

- After adjusting for inflation, median gross rent has increased across the region by approximately \$117, \$98, and \$122 for Clackamas, Multnomah, and Washington counties, respectively.
- Increases in rent coincide with trends seen in increased numbers of cost-burdened renters.

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP04; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

¹² Vacant land sales price is difficult to accurately measure because the number of transactions are few and many are not arms length sales.

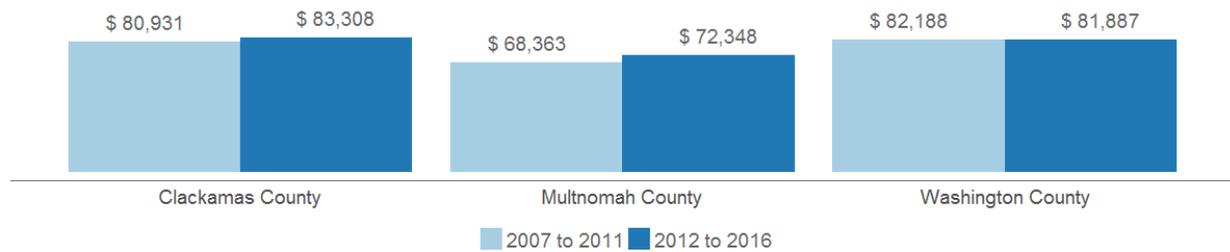
Median Household, Family, and Non-Family Income

Household income is a component of housing affordability. This indicator falls under economic trends necessary to determine housing choice (i.e., tenure, type and density) as noted in ORS 197.296.

Median Household Income



Median Family Income



Median Non-Family Income

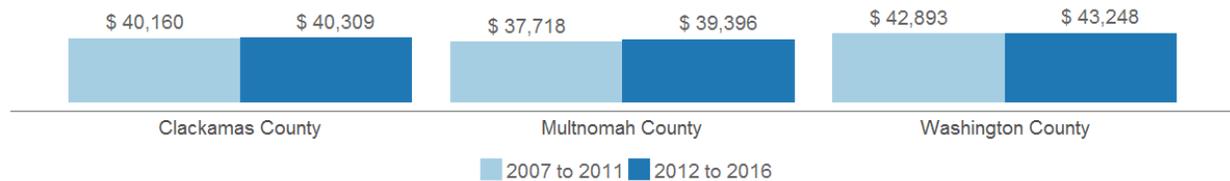


Figure 1: Median incomes in Clackamas, Multnomah, and Washington counties

- Median household income increased throughout the region, with Multnomah County experiencing the greatest increase (\$3,325) and Clackamas County experiencing the least (\$852)¹³.
- Median family income increased in Clackamas and Multnomah counties, but slightly decreased in Washington County.
- Multnomah County experienced the greatest increase in median non-family income. Minimal increases were seen in Clackamas and Washington counties.

Definitions:

- U.S. Census defines a “household” as all the people who occupy a housing unit
- A family is a group of two people or more (one of whom is the householder) related by birth, marriage, or adoption and residing together
- A nonfamily household consists of a householder living alone (a one-person household) or where the householder shares the home exclusively with people to whom he/she is not related

¹³ All median income estimates (i.e., household, family, non-family) are reported in 2016 inflation-adjusted dollars.

Data sources:

U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates, Table DP03; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

U.S. Census Bureau; American Community Survey, 2012-2016 American Community Survey 5-Year Estimates, Table DP03; generated by Metro Research Center; using American FactFinder; <https://factfinder.census.gov>; (7 May 2018).

Development in habitat conservation areas (HCA)

ORS 197.301 asks for metric regarding the amount of environmentally sensitive land that has been developed.

The source for this metric is a December 18, 2015 Metro progress report memorandum on nature in the neighborhood.

Development within Habitat Conservation Areas (HCA)

The development in HCA in the Metro UGB were tabulated by: total number, acreage and number of tax lots with new building permits over two relatively similar time periods; 2000 to 2006 and 2006 to 2014. The idea was to compare development impacts to HCAs prior to and after adoption of Title 13. The Research Center data show relatively few permits approved for development within HCAs. Those areas fully within HCAs are the least likely to have a development permit recorded, partial HCAs are also less likely to have a development permit recorded than other areas with no HCAs.

Data: Between 1998 and 2014 only 1.4% of permits recorded were completely within a locally adopted Habitat Conservation Area (HCA). 89% of all permits were in areas without any HCAs, 9.6% of permits included some portion of a parcel with a HCA.

Floodplains

Development in floodplains was assessed over two time periods; 1998 to 2006 and 2006 to 2014. “Development” was loosely defined for this study as an apparent change in land use, including construction of new structures, filling of lowlands, or clearing of vegetation. During the 16-year study period, the data show less than one percent development in floodplains per decade.

Data: Developed area within (roughly 14,000 acres designated as) floodplain areas in the UGB increased from ~3285 to ~3400 acres (23.6% to 24.4%) at a relatively constant rate of about 1% per decade.

Habitats of Concern

Habitats of Concern (HOC’s) were qualitatively described and mapped between 2002 and 2005. The habitats identified at that time cover approximately 38,000 acres, with roughly 18,000 acres inside the Urban Growth Boundary (UGB), and 20,000 acres outside the UGB. Overall, less than one percent of land designated HOCs were found altered between 2007 and 2014.

Data: About 160 acres of land (0.4 percent of total HOC areas) were altered between 2007 and 2014. Overall, 92 percent of the land use change within HOCs occurred inside the UGB.

Tree Canopy Loss within HCAs

Using LiDAR, aerial photography, and land cover data, the Research Center developed models for tree canopy in 2007 and 2014 and set out to compare the data sets as a way of measuring the performance

objectives established in Title 13. The research shows that during the period 2007-14, less than ~1% canopy loss - about 150 acres total - occurred within the high and moderate value HCAs.

Data: Approximately 22,500 acres of tree canopy existed in 2007 in high to moderate value HCA's. The current change detection methodology bases canopy loss calculations upon a minimum area threshold of 0.25 (one quarter) acres, and is likely a slight underestimate of actual aggregate canopy loss.