

Who is going where in King County?

Exploring novel data sources

Applied Research Fellowship Program
Population Health Initiative, University of Washington
17 August 2023



Meet the team!



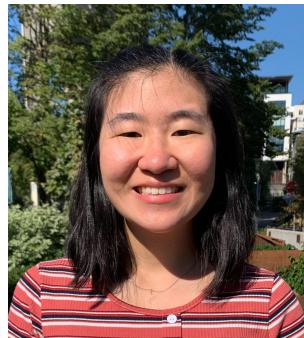
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Outline

Project Background

Research Questions

Data Sources

Measuring Migration

County-level Results

Area-level Results

Summary & Next Steps

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Summary & Next Steps

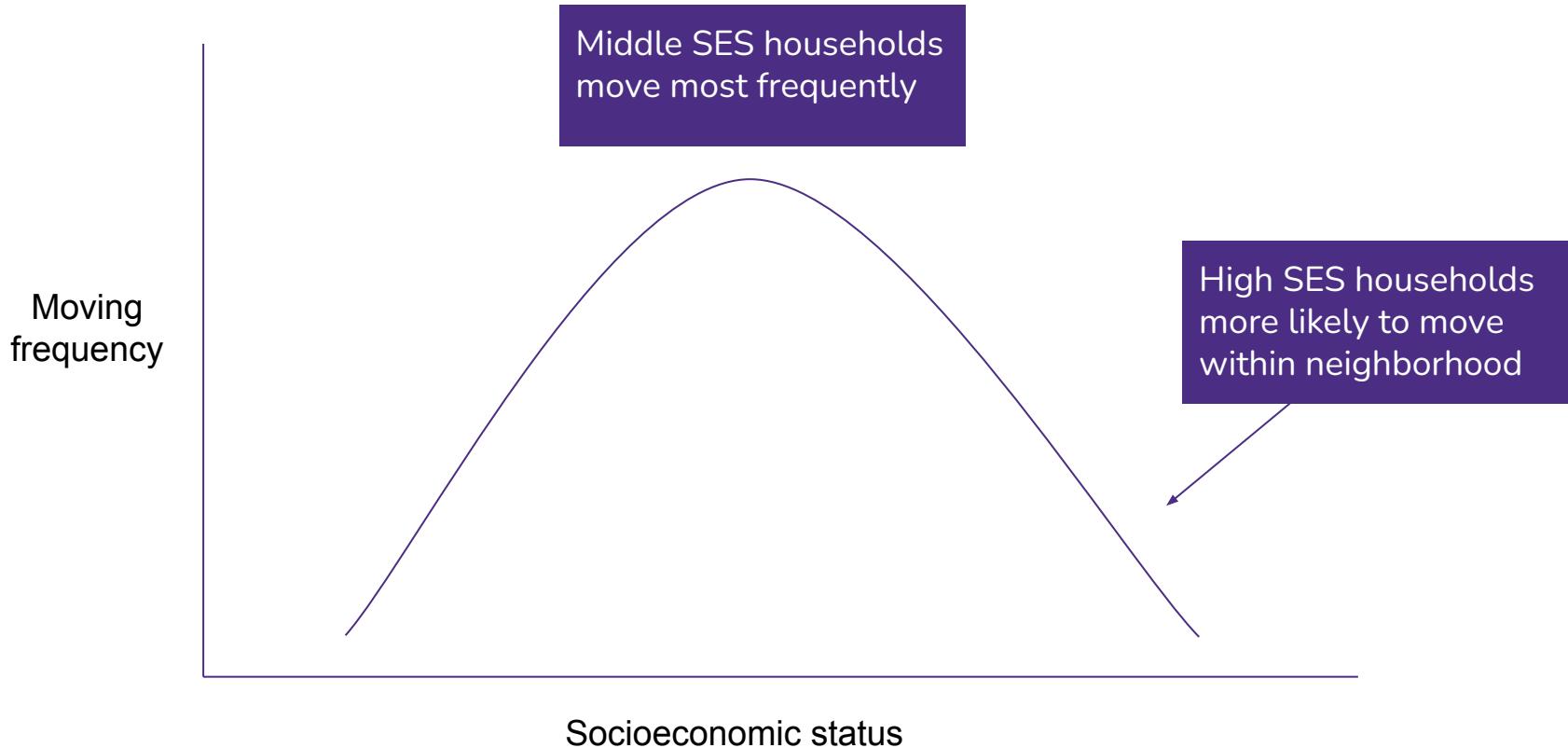
What do we know about migration in King County?

- ❖ In-migration to King County has increased rapidly over the past two decades
 - Expansion of high-paying jobs in the tech sector
 - Pressure on existing housing supply

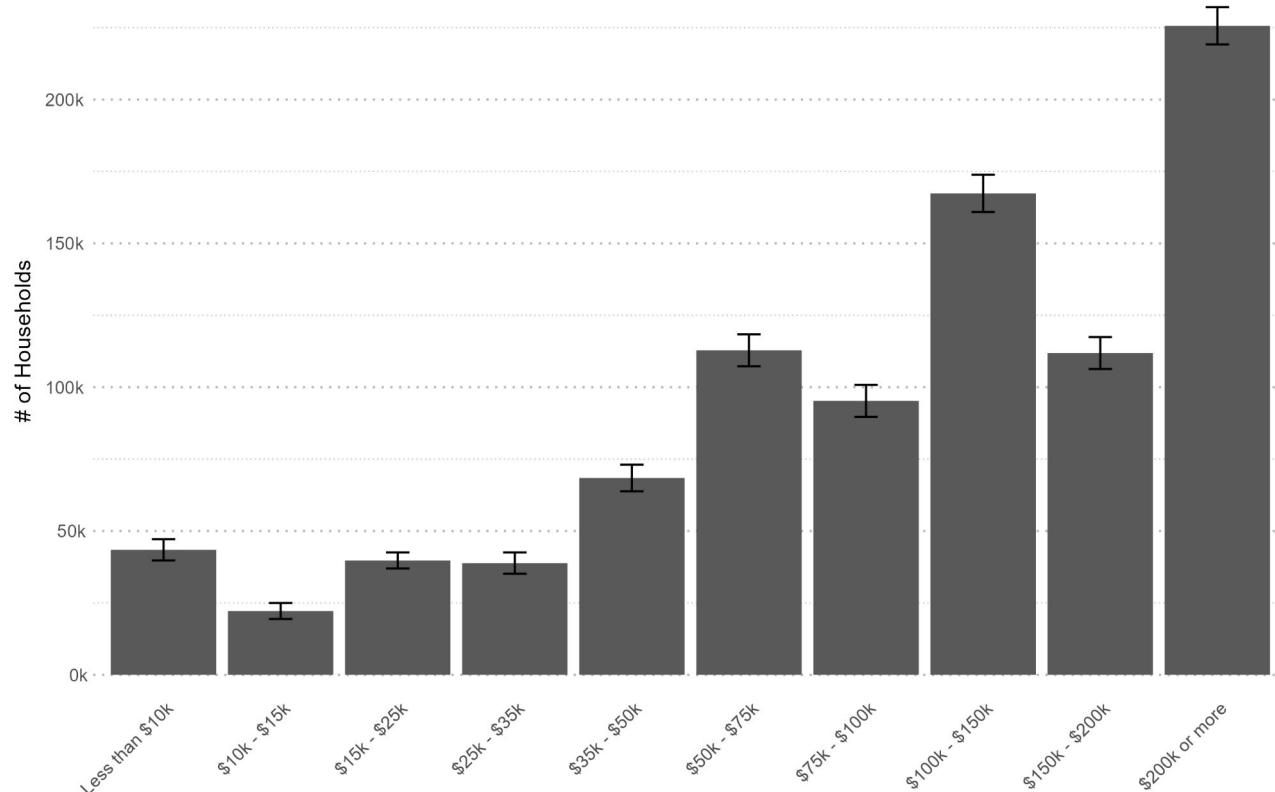
- ❖ This has led to increased internal migration within King County
 - Displacement of low income households
 - **Focus areas:** South Seattle, South King County



The inverted “U-shape” of household migration



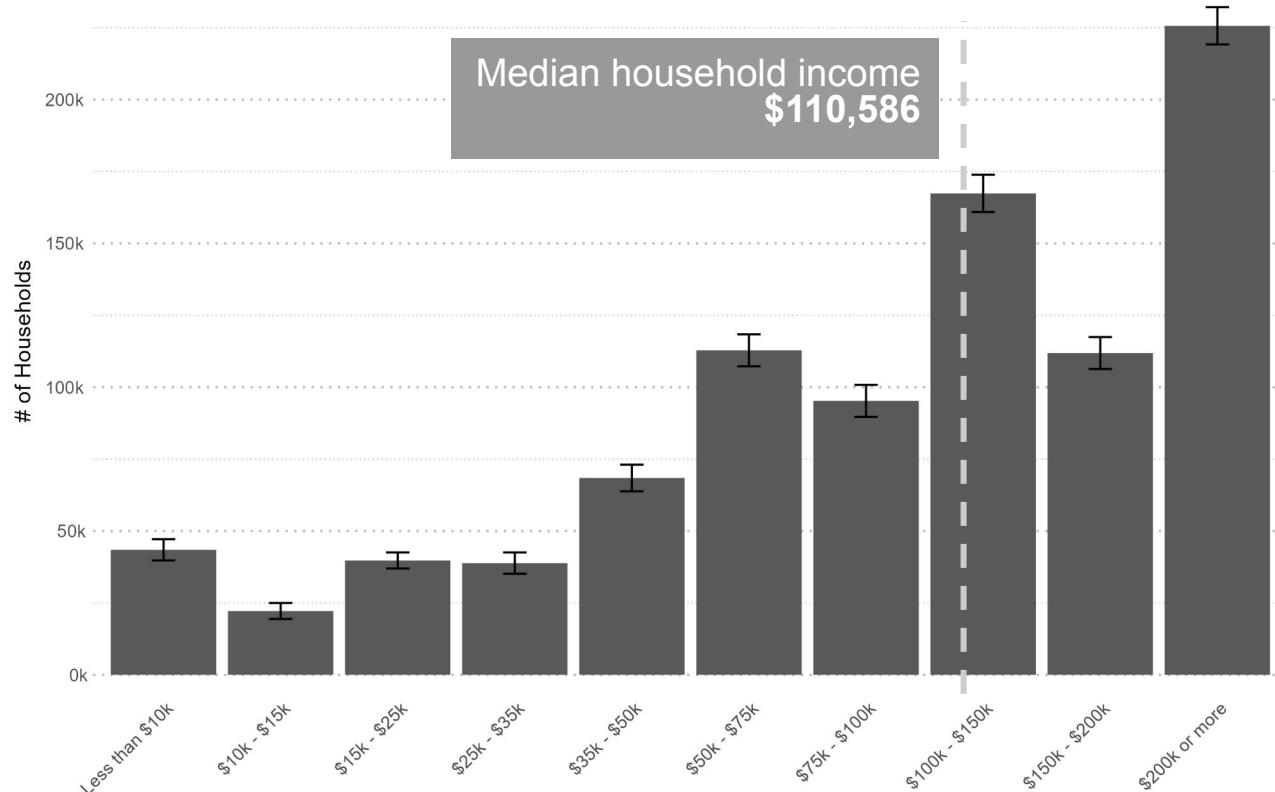
King County 2021 Household Income Distribution



Source: 2021 ACS



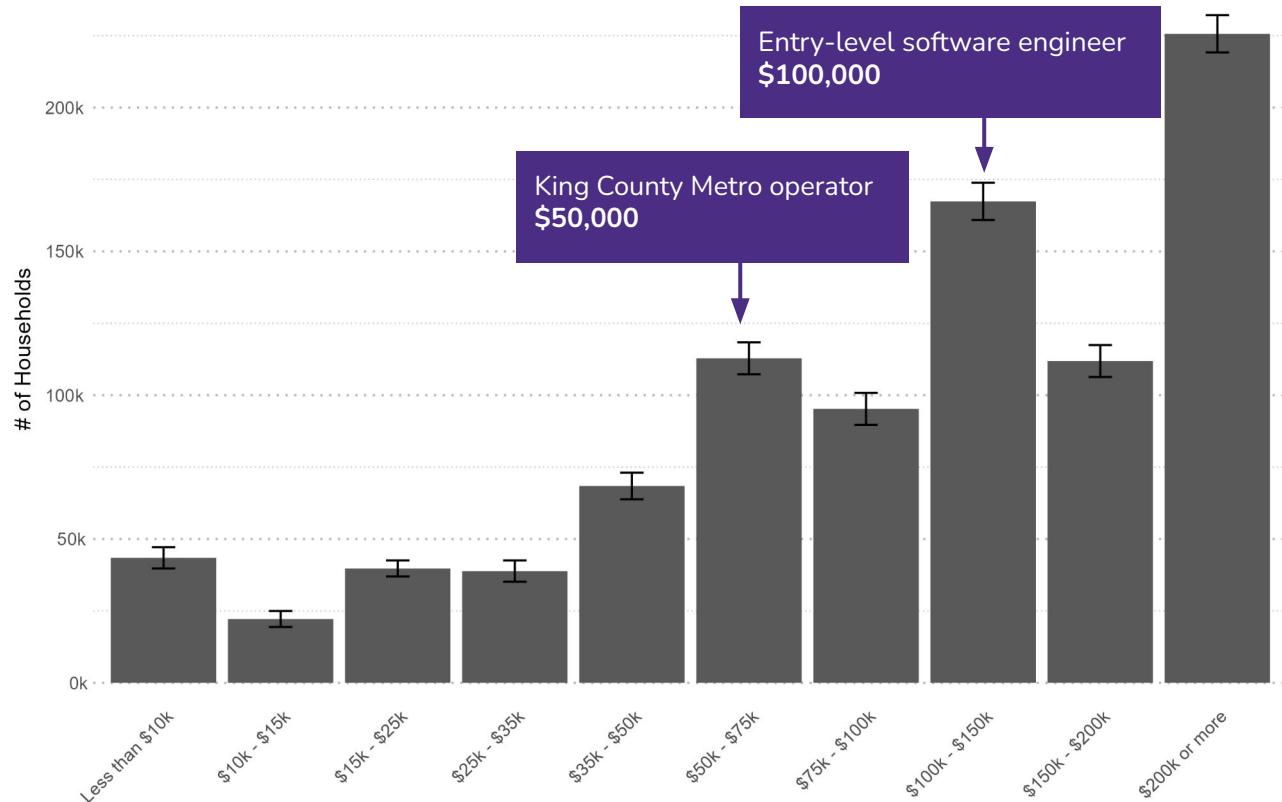
King County 2021 Household Income Distribution



Source: 2021 ACS



King County 2021 Household Income Distribution



What don't we know?

Estimates on a
yearly time scale

Precise estimates at
the sub-county level

Impact of recent events
(e.g. COVID-19)



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What can we learn about migration from Data Axe?

Where are people moving within Seattle and South King County?

What are the socioeconomic conditions of people's origins and destinations?



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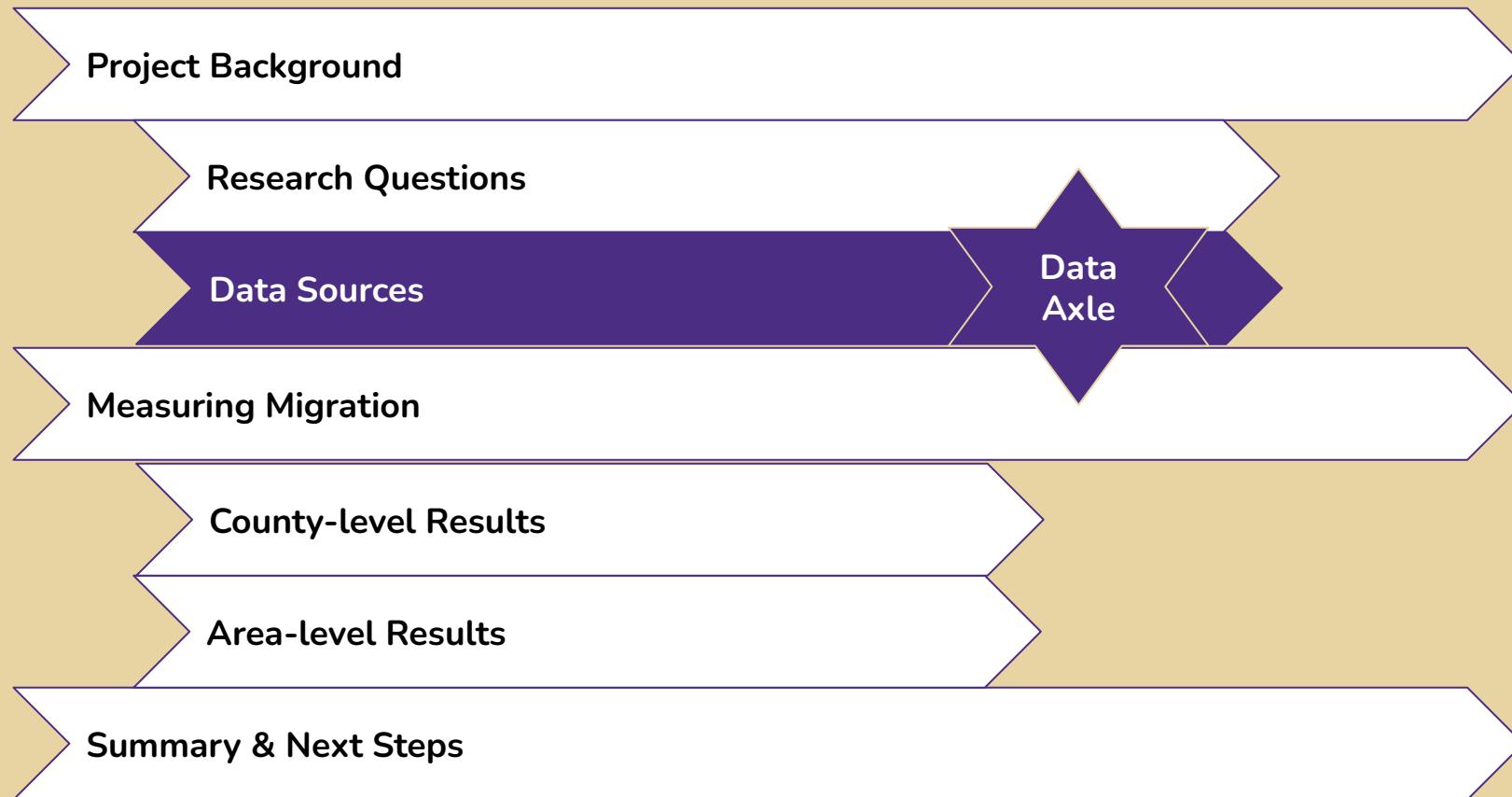
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Data Axle Problem: Not a Representative Sample

Key data sources for Data Axle

| Sources | Nature |
|--|---------|
| Utility connections and changes | Public |
| Change-of-address notifications | Private |
| Real estate tax assessments and deed transfers | Public |
| Voter registrations (where available for marketing applications) | Public |
| Credit card billing statements | Private |
| Public records, such as bankruptcies, pilot licenses, hunting licenses, and boat registrations | Public |
| Telephone white page directories | Private |
| Newspaper and magazine subscription lists | Private |

Note: Data Axle indicates that it has over 100 contributing sources but does not list them all.

Source: Acolin, Decter-Frain, and Hall (2022)

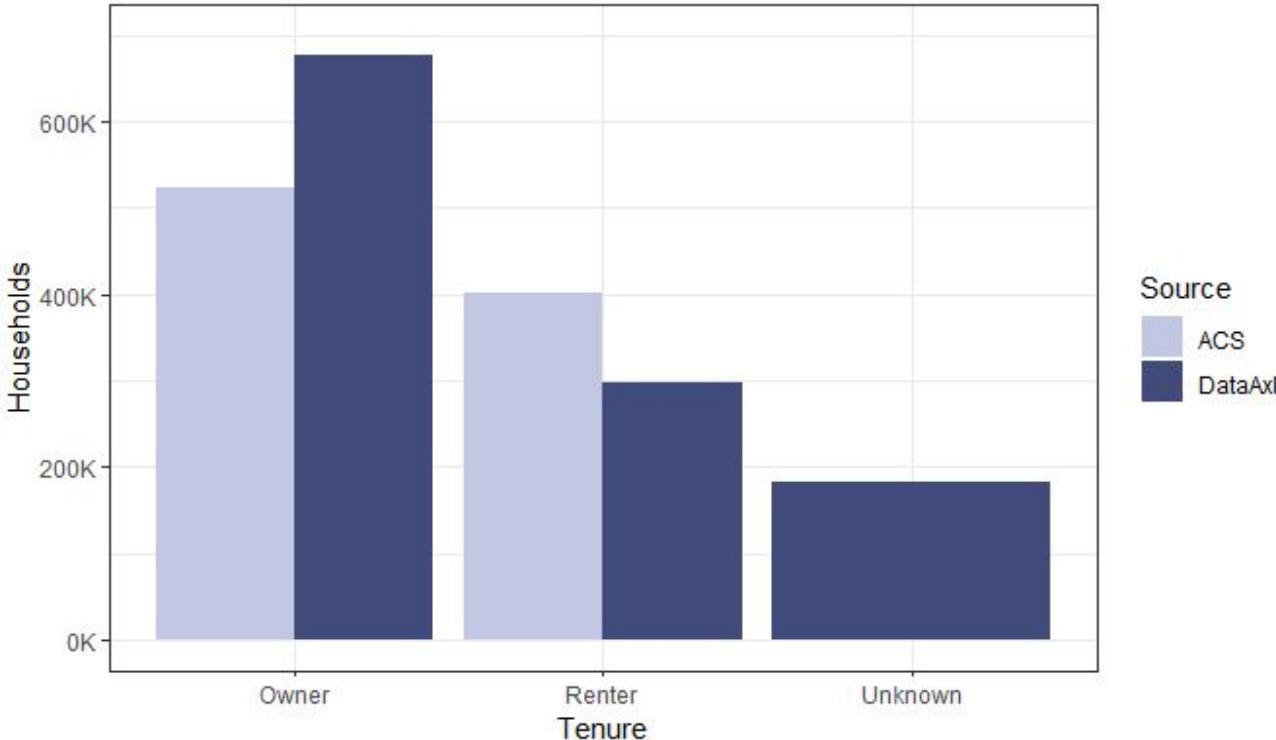
**Annual household addresses
(2017-2022)**

Over-represents people who are more financially stable

- Homeowners
- Older adults



Data Axle Problem: Not a Representative Sample

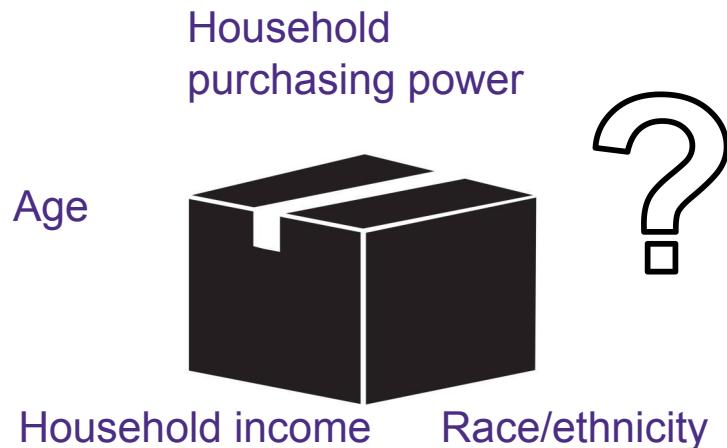


Source
■ ACS
■ DataAxe

- ❖ Tenure is
 - Self-reported
 - Imputed
- ❖ Owners are overrepresented
- ❖ Households are overestimated



Data Axle Problem: Model-based Demographic Indicators



Lack of transparency in how demographic indicators are formed



Data Axle Problem: Missing addresses

| Household | 2017 | 2018 | 2019 | 2020 | 2021 |
|-----------|---------|------|---------|---------|---------|
| 1 | Tract A | x | Tract A | Tract A | Tract A |
| 2 | x | x | Tract B | Tract B | Tract B |



| Household | 2017 | 2018 | 2019 | 2020 | 2021 |
|-----------|---------|---------|---------|---------|---------|
| 1 | Tract A |
| 2 | x | x | Tract B | Tract B | Tract B |



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SORL

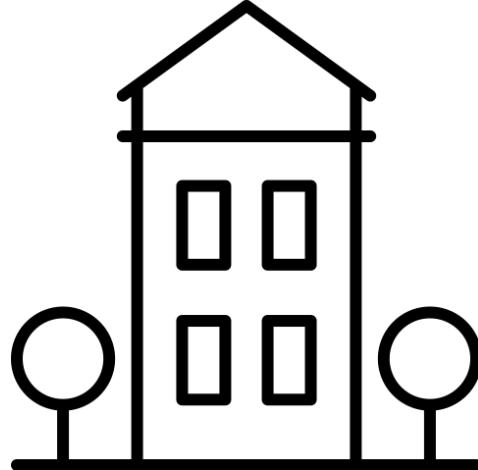
Understanding Origins & Destinations

Scraped Online Rental Listings (SORL)

800,000+ Craigslist rent listings
from Jan 2017 - June 2023

Data includes:

- ❖ # of bedrooms 
- ❖ Asking rent 
- ❖ Date of availability 
- ❖ Geolocation 



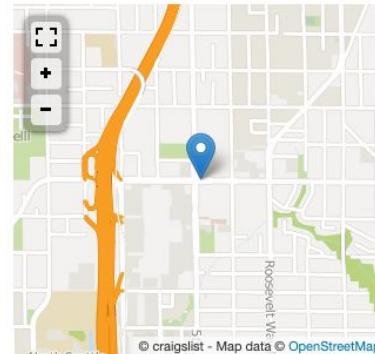
Rental Listing Problem: Extreme Outliers



Posted a day ago

[print](#)

\$17 / 1br - 598ft² - bright 1 bedroom with den and walk-in closet (Northgate)



525 NE Northgate way near 5th ave

[google map](#)

1BR / 1Ba **598ft²** **available now**

cats are OK - purrr

dogs are OK - woof

apartment

w/d in unit

attached garage

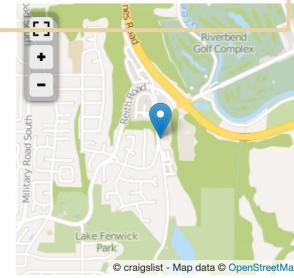
rent period: **monthly**



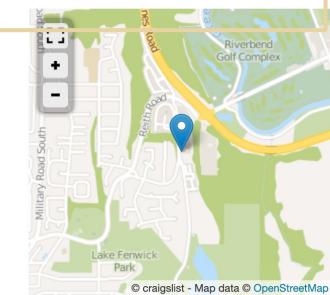
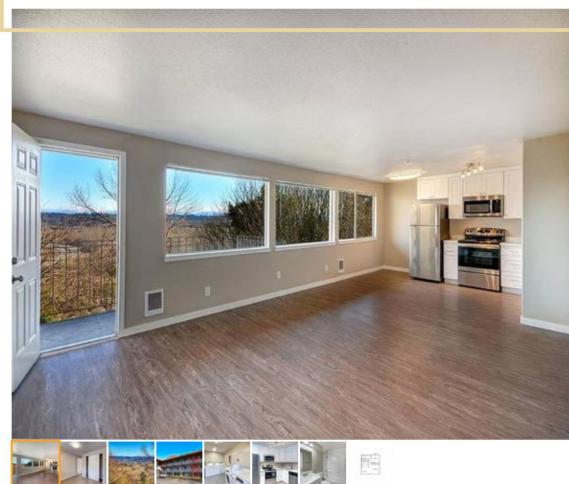
This is a 1 Bedroom, 1 Bath, Approximately 598 Sq. Ft.

Rental Listing Problem: Duplicate Listings

\$1,350 / 1br - 520ft² - 1B/1B, Great Location, Updated Modern Kitchen Cabinetry (4809 S 252nd Pl, Kent, WA)



\$1,350 / 1br - 520ft² - Hardwood-Like Flooring Throughout, Great Location, 1B/1B (4809 S 252nd Pl, Kent, WA)



4809 S 252nd Pl, Kent, WA 98032

1BR / 1Ba 520ft² available now

cats are OK - purrr

dogs are OK - woof!

apartment

laundry on site

no smoking

1BR / 1Ba 520ft² available now

cats are OK - purrr

dogs are OK - woof!

apartment

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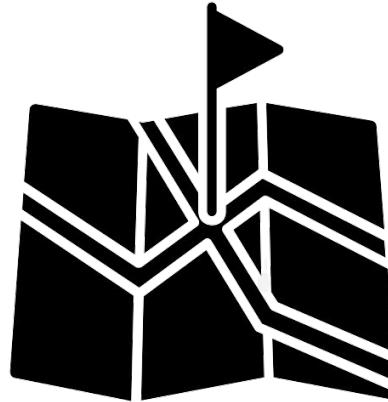
Summary & Next Steps

Other

Understanding Origins & Destinations

American Community Survey (ACS)

- ❖ Households by Tenure
- ❖ Individuals living in the same residence 1 year ago
 - By Tenure
 - By Age



Public Data Sources

- ❖ Multi-family land use (King County Assessor Data)
- ❖ # of transit stops (King County Metro and Sound Transit data)
- ❖ School sites and school districts
- ❖ Environmental exposure (WA DOH Environmental Health Disparities Data)



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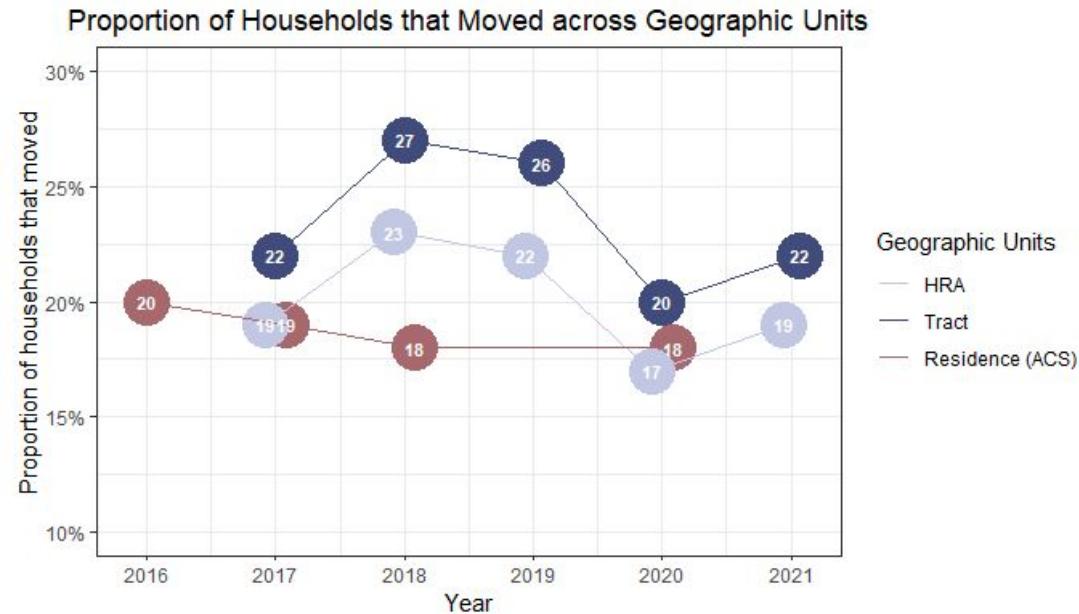
Summary & Next Steps

County-level Migration 2016-2021

Crude Migration Probability

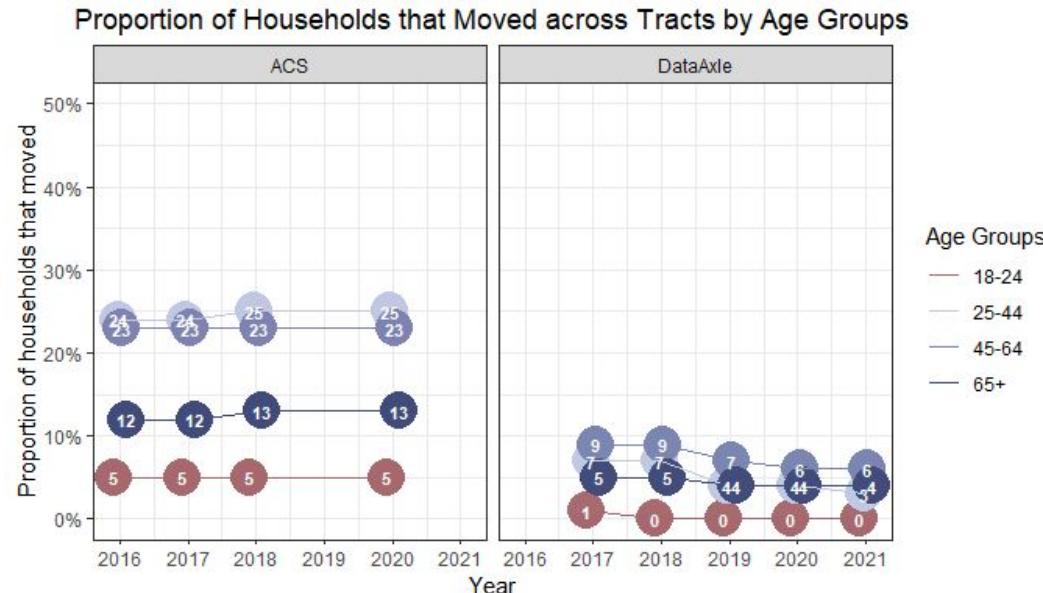
$$\frac{\# \text{ HHs moved across geographic units}}{\# \text{ Total HHs}}$$

- ❖ Measures general magnitude of migration
- ❖ Does not differentiate between in- and out-migration



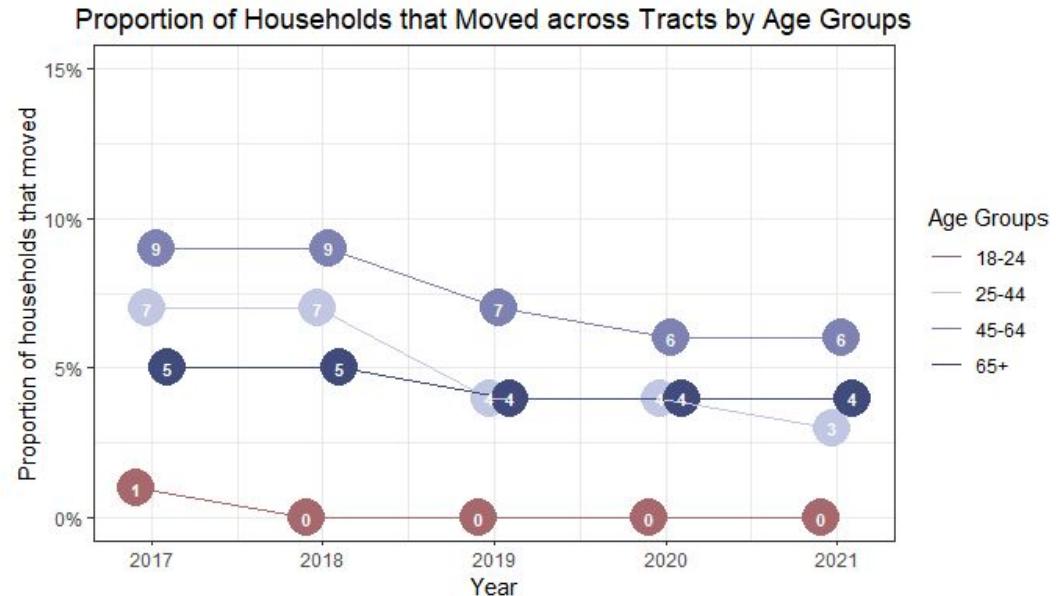
Age-specific Migration: Comparison with ACS

- ❖ Age is imputed in Data Axle and inaccurate
- ❖ Ordering across age is similar to ACS
- ❖ Lower rates across age than ACS
- ❖ “Stayers” most likely to be observed in Data Axle



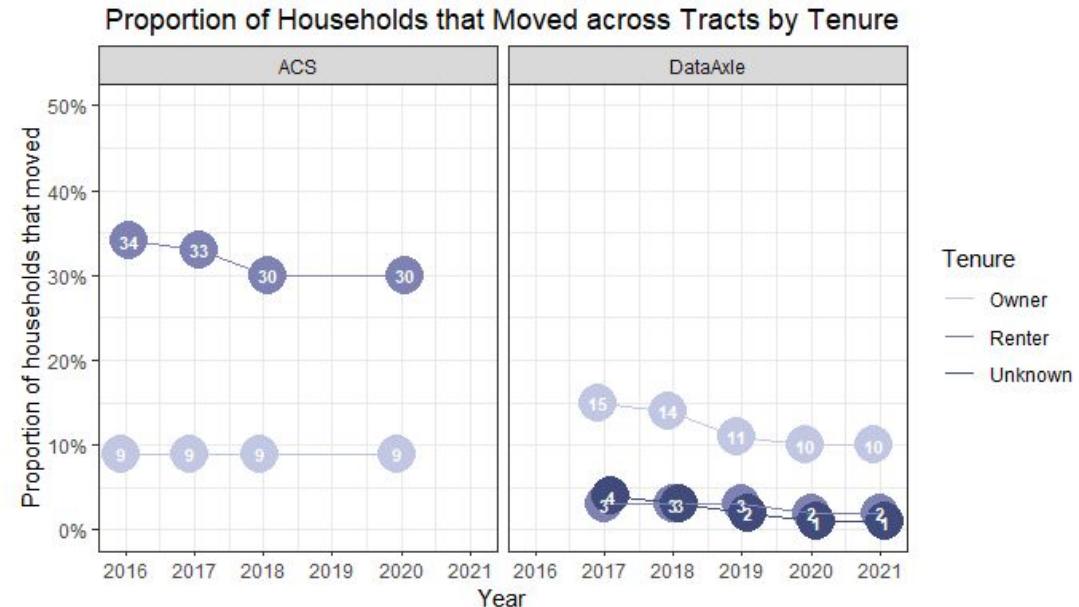
Age-specific Migration: Data Axe

DataAxe shows a decrease in migration activity for 25-44 and 45-64 year olds

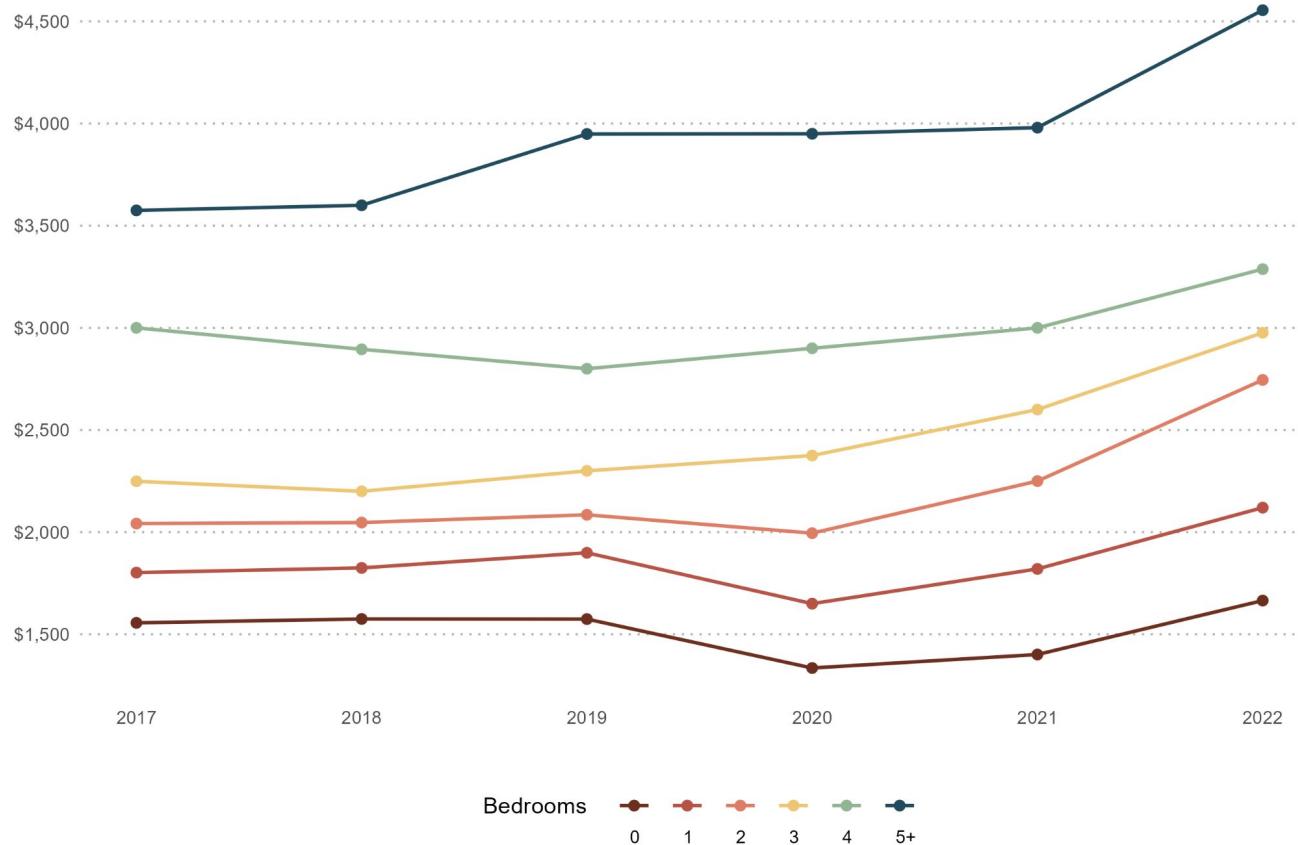


Migration by Tenure: Comparison with ACS

- ❖ Tenure is the “most trustworthy” variable
- ❖ Slightly overestimate owner moves
- ❖ Greatly underestimate Renter moves

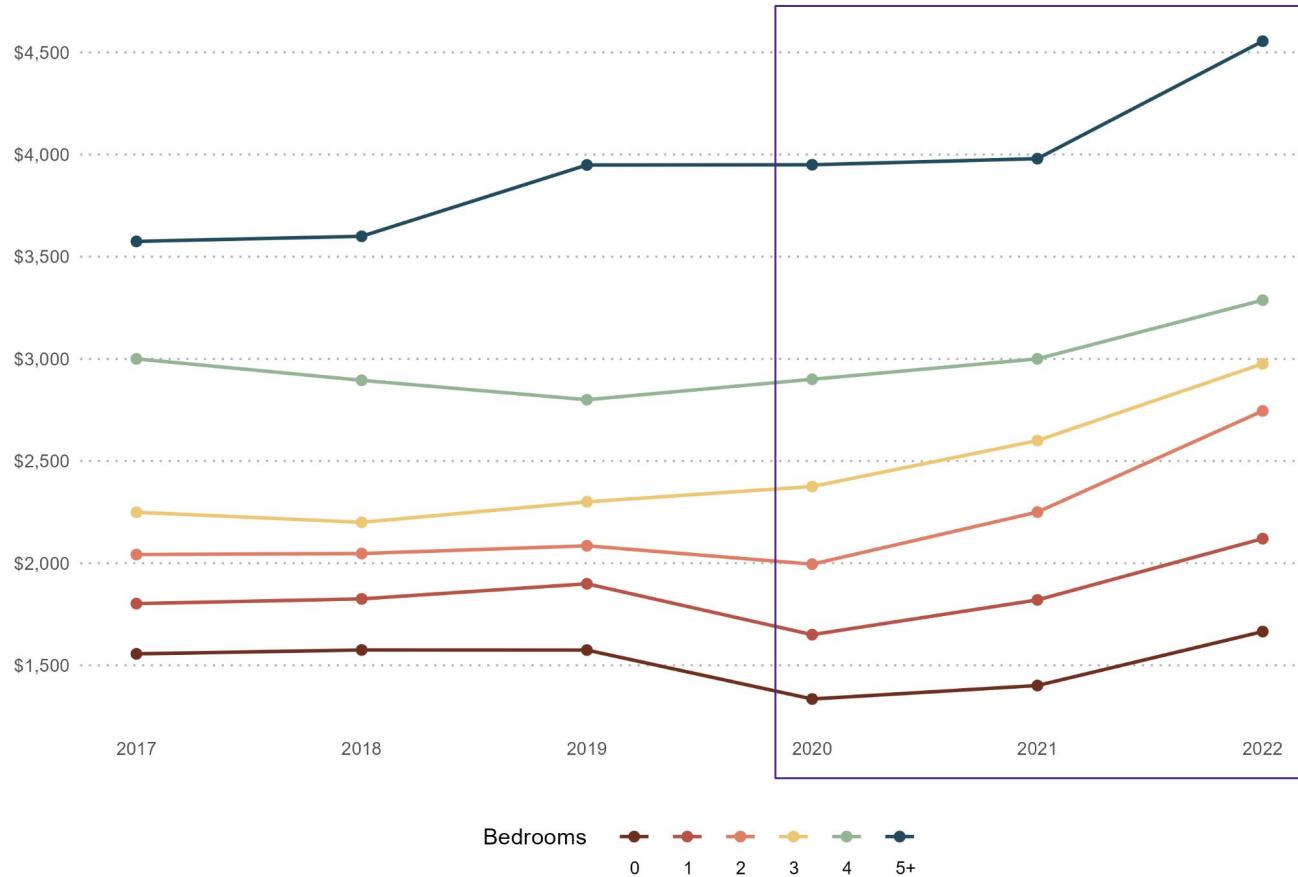


Median Rent by Bedrooms (2017-2022)



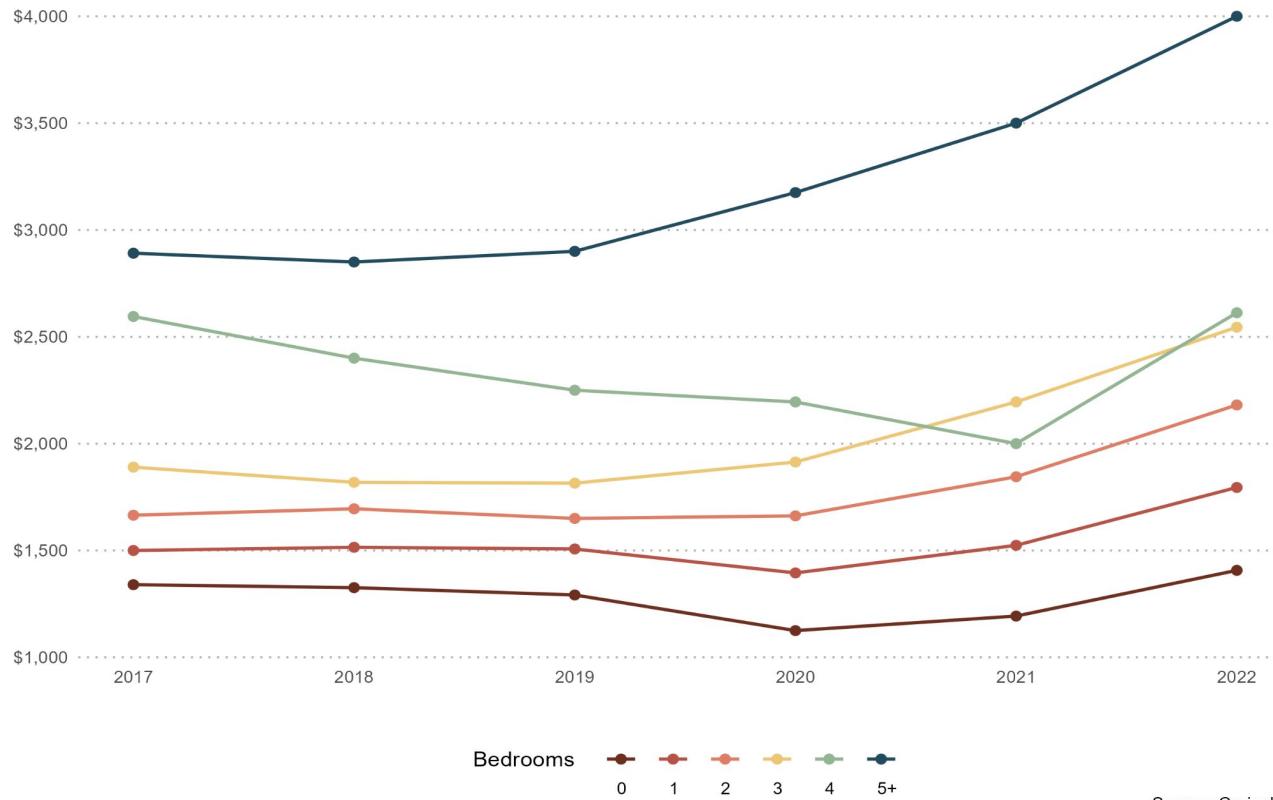
Source: Craigslist

Median rent by bedrooms (2017-2022)



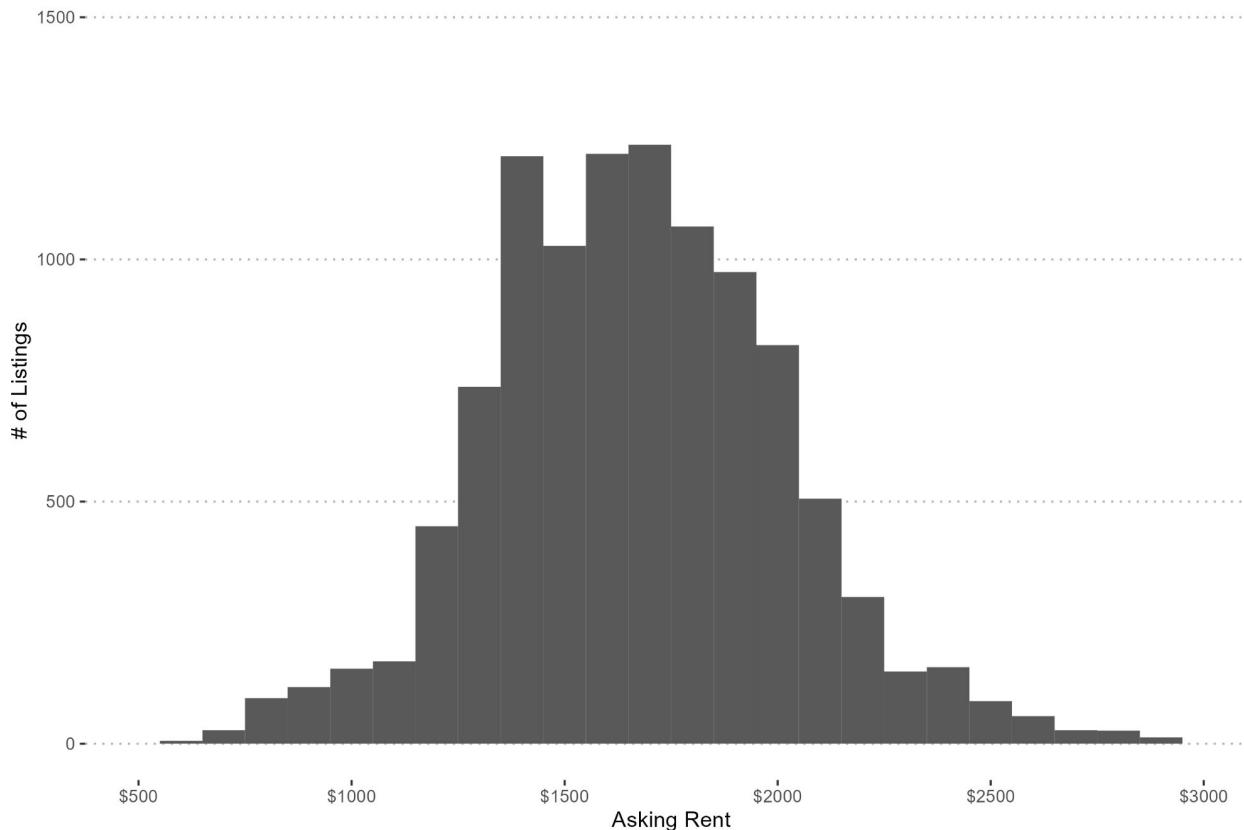
Source: Craigslist

First Quartile (1Q) Rent by Bedrooms (2017-2022)



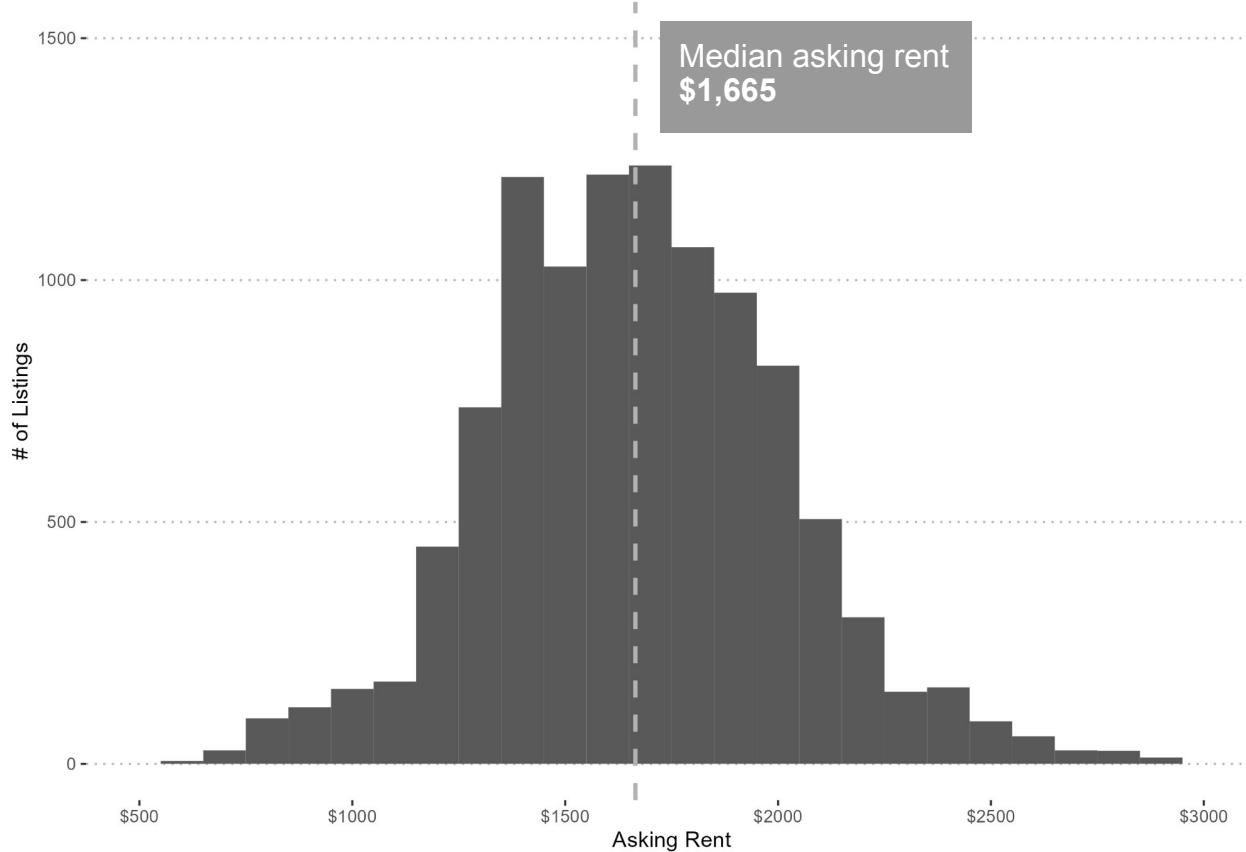
Source: Craigslist

Studio Rent Distribution (2022)



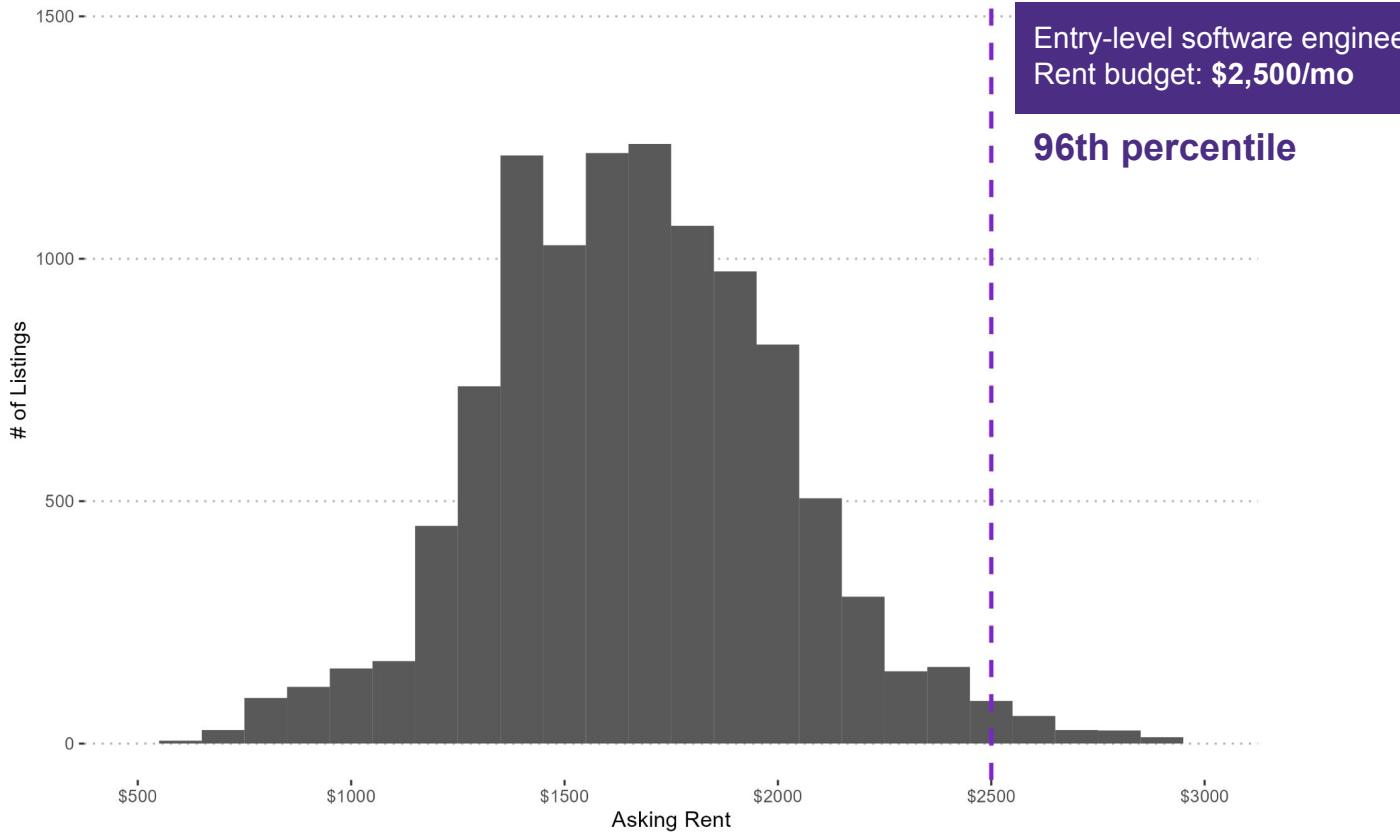
Source: Craigslist 2022

Studio Rent Distribution (2022)



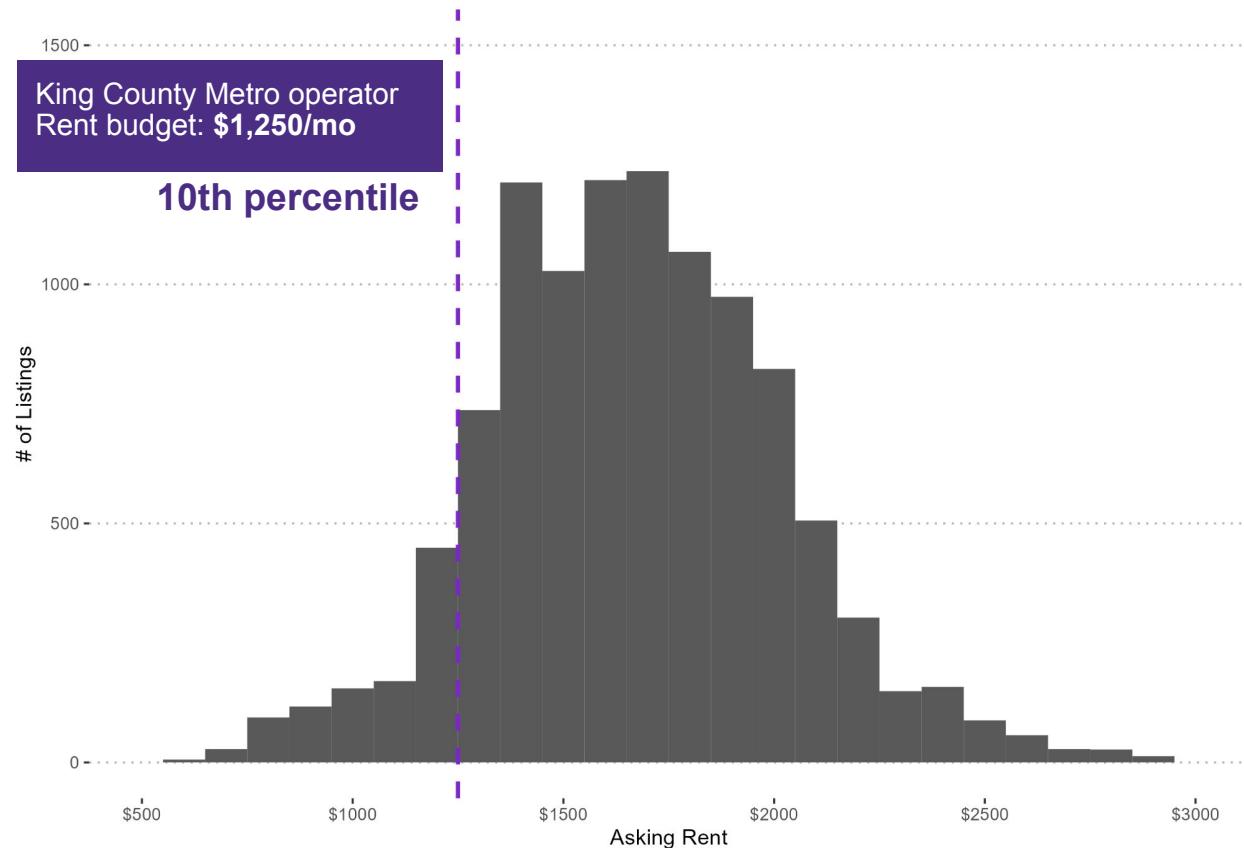
Source: Craigslist 2022





Source: Craigslist 2022





Source: Craigslist 2022



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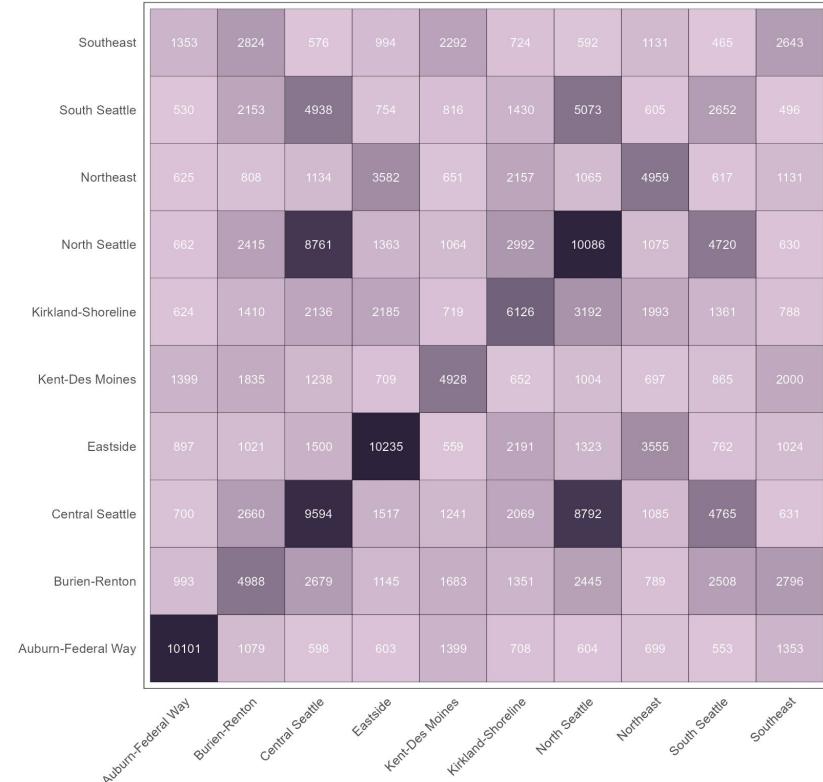
Summary & Next Steps

Migration flows across HRA groupings

2017



2021



Migration flows across HRA groupings

2017

| | Auburn-Federal Way | Burien-Renton | Central Seattle | Eastside | Kent-Des Moines | Kirkland-Shoreline | North Seattle | Northeast | South Seattle | Southeast |
|--------------------|--------------------|---------------|-----------------|----------|-----------------|--------------------|---------------|-----------|---------------|-----------|
| Southeast | 1154 | 2295 | 527 | 933 | 1896 | 591 | 520 | 1001 | 413 | 2186 |
| South Seattle | 475 | 1901 | 4084 | 661 | 731 | 1168 | 3919 | 530 | 2344 | 360 |
| Northeast | 542 | 656 | 950 | 3032 | 549 | 1764 | 952 | 4198 | 535 | 973 |
| North Seattle | 536 | 2153 | 7144 | 1154 | 902 | 2599 | 8686 | 983 | 3915 | 575 |
| Kirkland-Shoreline | 515 | 1165 | 1782 | 2013 | 589 | 4892 | 2859 | 1686 | 1119 | 657 |
| Kent-Des Moines | 1174 | 1622 | 1008 | 603 | 3840 | 546 | 870 | 607 | 811 | 1732 |
| Eastside | 753 | 939 | 1293 | 8531 | 496 | 1876 | 1182 | 3021 | 616 | 838 |
| Central Seattle | 565 | 2303 | 7691 | 1214 | 982 | 1853 | 6763 | 1022 | 3961 | 544 |
| Burien-Renton | 874 | 4044 | 2131 | 1003 | 1465 | 1131 | 2160 | 756 | 2201 | 2352 |
| Auburn-Federal Way | 8302 | 131 | 492 | 483 | 1225 | 579 | 548 | 564 | 478 | 1174 |

2021

| | Auburn-Federal Way | Burien-Renton | Central Seattle | Eastside | Kent-Des Moines | Kirkland-Shoreline | North Seattle | Northeast | South Seattle | Southeast |
|--------------------|--------------------|---------------|-----------------|----------|-----------------|--------------------|---------------|-----------|---------------|-----------|
| Southeast | 1353 | 2824 | 576 | 994 | 2292 | 724 | 592 | 1131 | 465 | 2643 |
| South Seattle | 530 | 2153 | 4938 | 754 | 816 | 1430 | 5073 | 605 | 2652 | 496 |
| Northeast | 625 | 808 | 1134 | 3582 | 651 | 2157 | 1065 | 4959 | 617 | 1131 |
| North Seattle | 662 | 2415 | 8761 | 1363 | 1064 | 2992 | 10086 | 1075 | 4720 | 630 |
| Kirkland-Shoreline | 624 | 1410 | 2136 | 2185 | 719 | 6126 | 3192 | 1993 | 1361 | 788 |
| Kent-Des Moines | 1399 | 1835 | 1238 | 709 | 4928 | 652 | 1004 | 697 | 865 | 2000 |
| Eastside | 897 | 1021 | 1500 | 10235 | 559 | 2191 | 1323 | 3555 | 762 | 1024 |
| Central Seattle | 700 | 2660 | 9594 | 1517 | 1241 | 2069 | 8792 | 1085 | 4765 | 631 |
| Burien-Renton | 993 | 4988 | 2679 | 1145 | 1683 | 1351 | 2445 | 789 | 2508 | 2796 |
| Auburn-Federal Way | 10101 | 1079 | 598 | 603 | 1399 | 708 | 604 | 699 | 553 | 1353 |



Measuring Area-level Migration

Out-migration rate

HHs moved out
of given area

Total HHs in
given area

In-migration rate

HH moved into
given area

Total HH in a
given area

Net migration

In-Migration Rate — Out-Migration Rate



Area-level in- and out-migration

| Geographic areas | Household ids in 2017 | Household ids in 2018 |
|------------------|-----------------------|-----------------------|
| Tract A | 1,2,3 | 1,3 |
| Tract B | 4,5 | 4,5,6 |



Area-level in- and out-migration

| Geographic areas | Household ids in 2017 | Household ids in 2018 |
|------------------|---------------------------------------|---------------------------------------|
| Tract A | 1, 2,3 | 1,3 |
| Tract B | 4,5 | 4,5, 6 |

Challenge

- ❖ HH 2: family dissolution or out-migration?
- ❖ HH 6: family formation or in-migration?

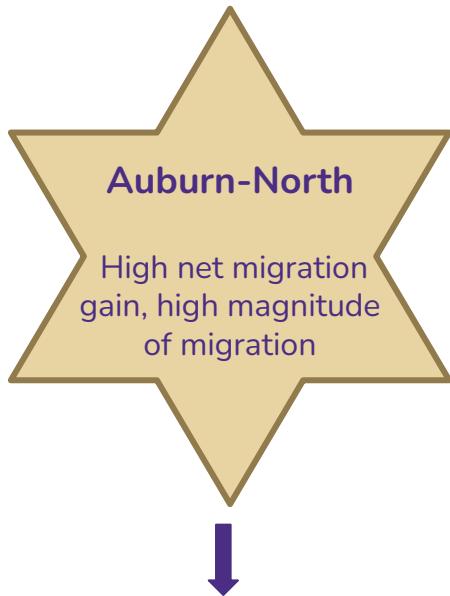


Solution

- ❖ Track HH 2 in 2018
- ❖ Track HH 6 in 2017



3 Area-Level Case Studies



55.4% non-white
43% low-income



67.9% non-white
57% low-income



76.7% non-white
79% low-income

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Auburn-
North

Summary & Next Steps

Auburn-North was consistently one of the top receiving areas

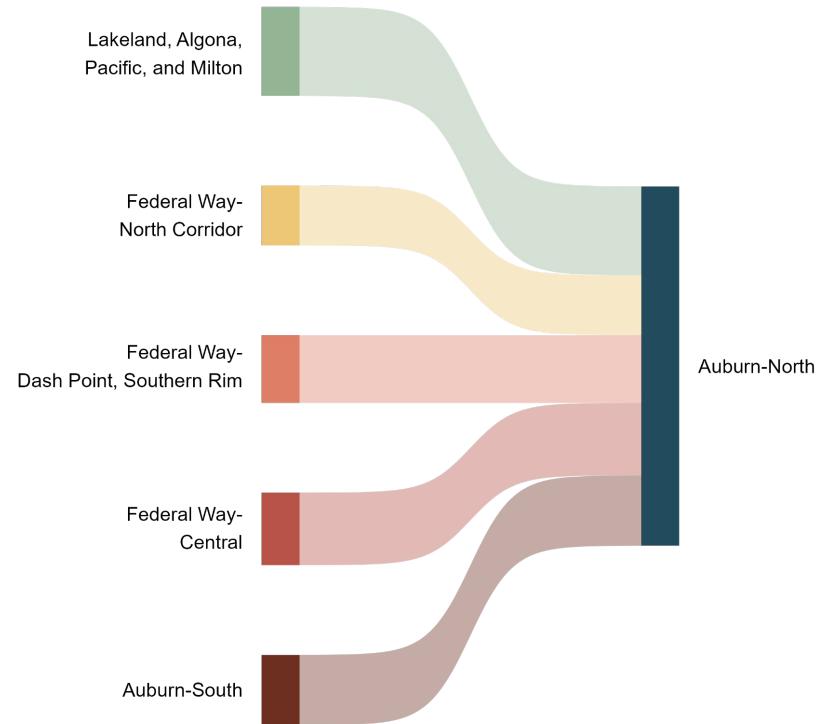
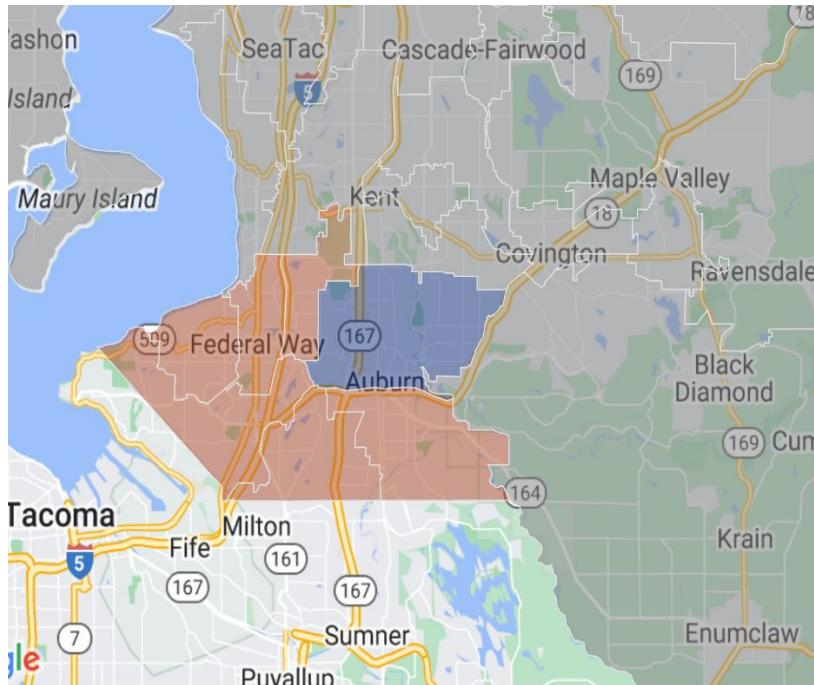
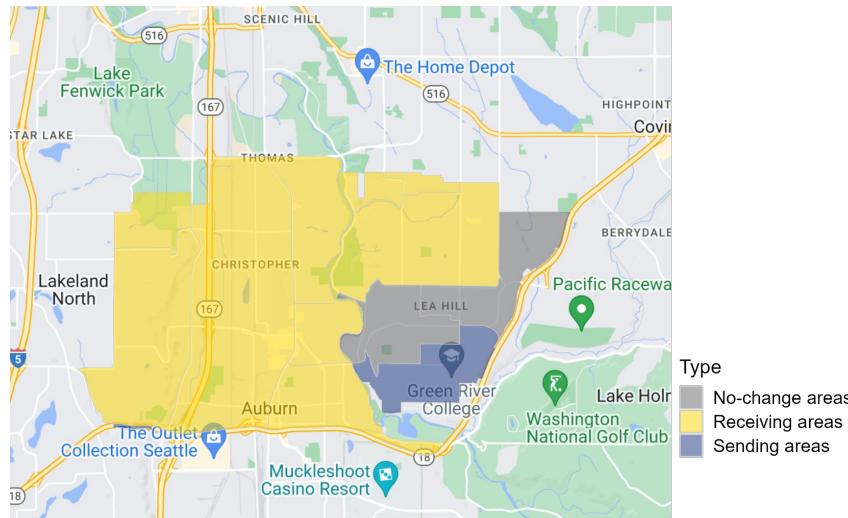


Figure reflects 2017

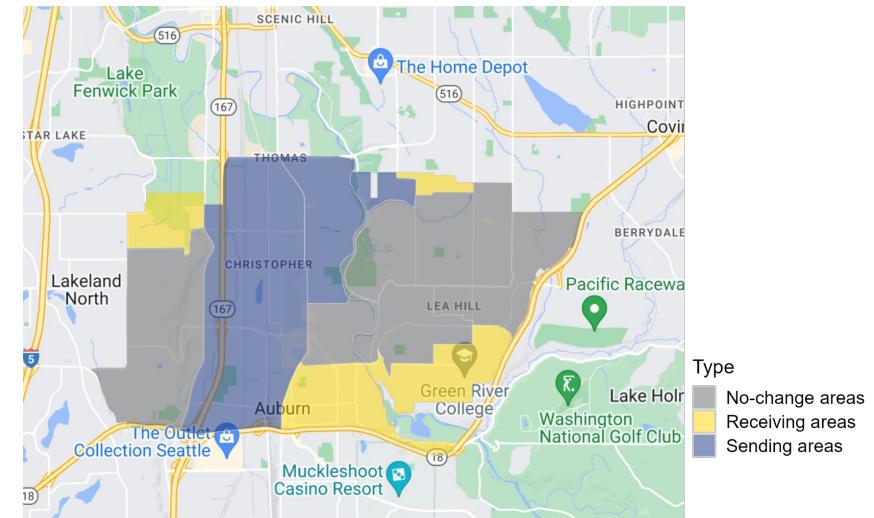


Tract-level Variation in Net Migration in Auburn-North

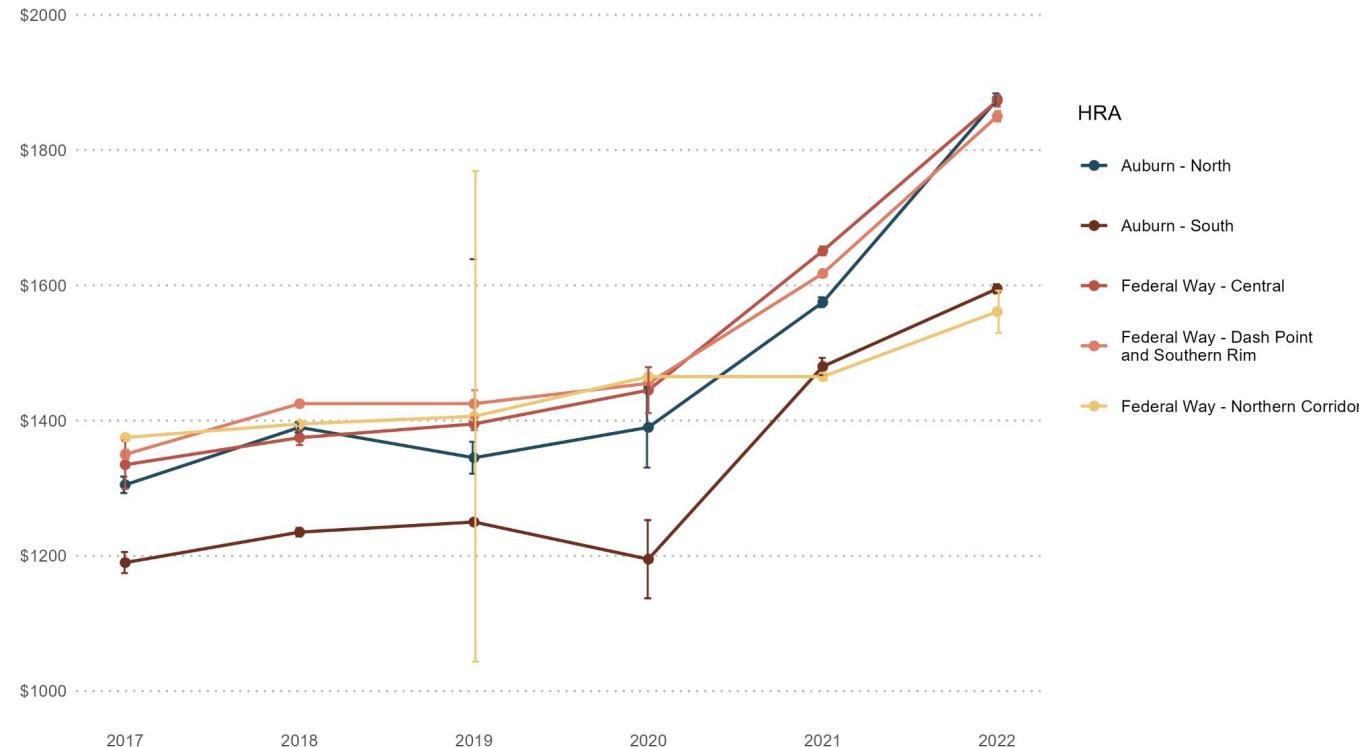
2017



2020



2-bedroom 1Q Rent Prices in Auburn North vs Top Sending Areas



Source: Craigslist

2-bedroom 1Q Rent Prices in Auburn North vs Top Sending Areas



Source: Craigslist

Environmental Exposure and Transit Access in Auburn North vs Sending Areas

Avg. environmental exposure: **8.0** 
Transit stops per sq mi: **11.8**



Avg. environmental exposure: **7.5** 
Transit stops per sq mi: **51.7**



Avg. environmental exposure: **6.2** 
Transit stops per sq mi: **21.8**



Avg. environmental exposure: **5.5** 
Transit stops per sq mi: **18.4**



Avg. environmental exposure: **6.3** 
Transit stops per sq mi: **17.5**



Avg. environmental exposure: **7.7**

Auburn-North

Transit stops per sq mi: **16**



Residential Land Use in Auburn North vs Sending Areas

% MF lots: 0.36% 

Lakeland, Algona,
Pacific, and Milton



% MF lots: 2.67% 

Federal Way-
North Corridor



% MF lots: 1.26%

% MF lots: 0.37% 

Federal Way-
Dash Point, Southern Rim



Auburn-North

% MF lots: 0.62% 

Federal Way-
Central

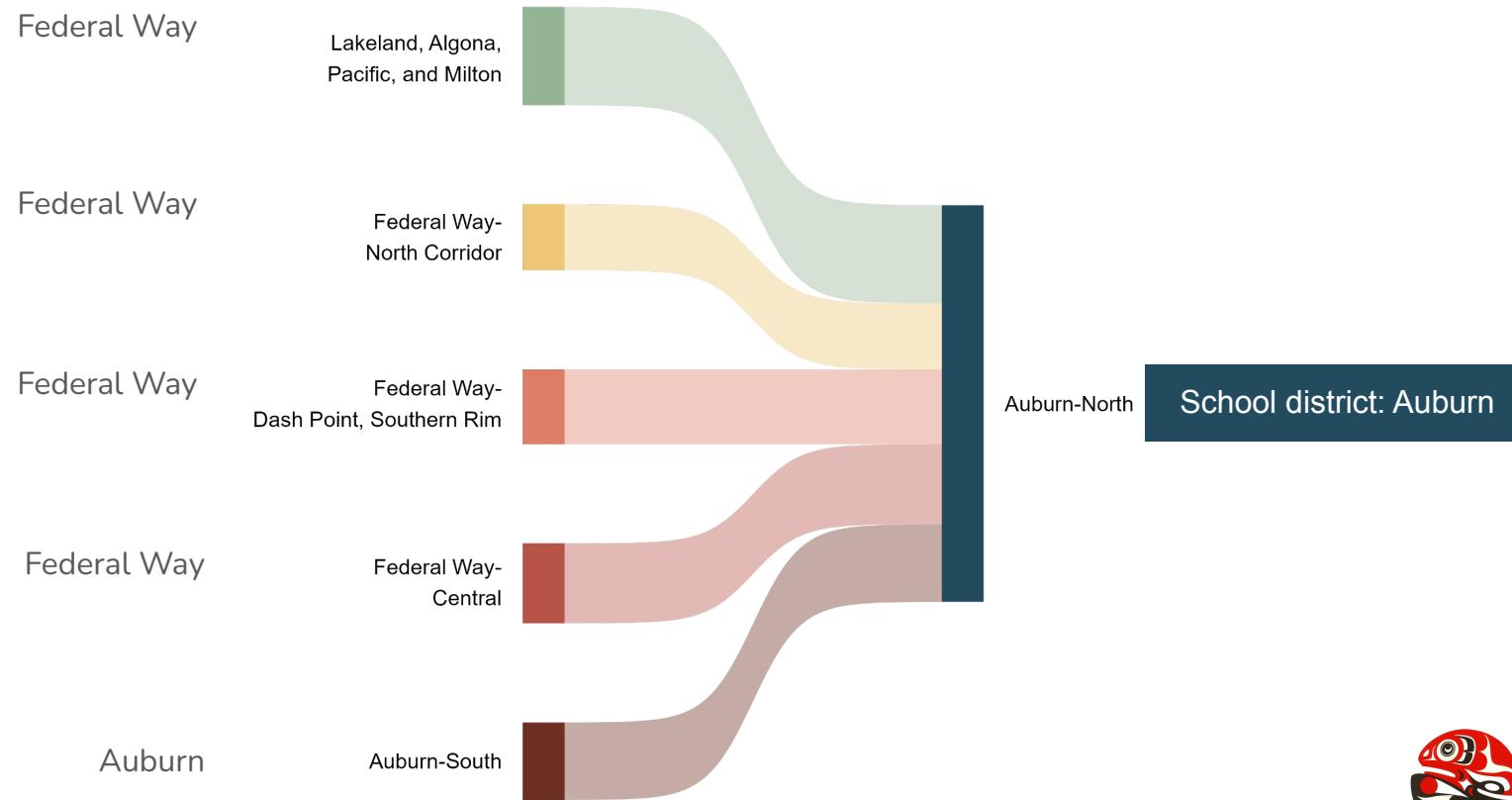


% MF lots: 1.98% 

Auburn-South



Main School Districts in Auburn North vs Sending Areas



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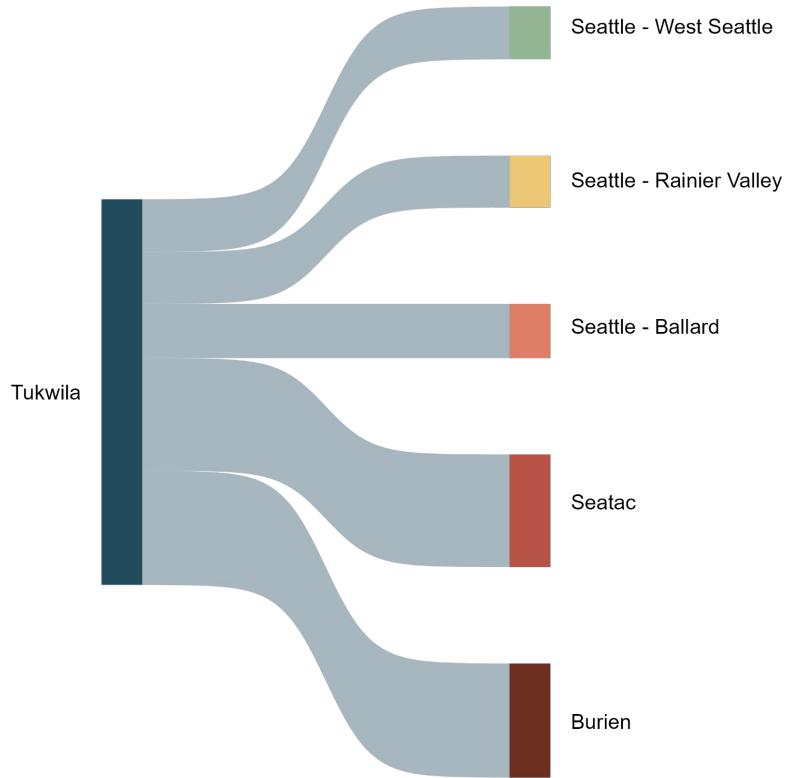
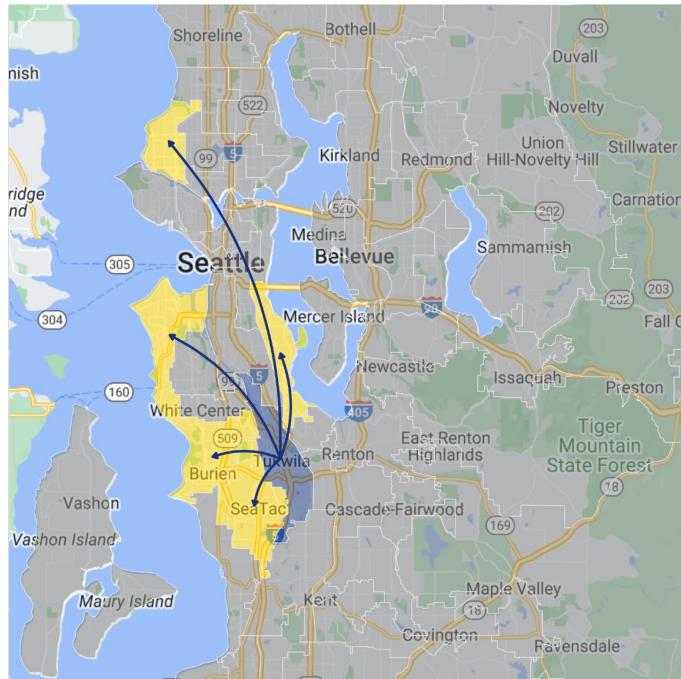
County-level Results

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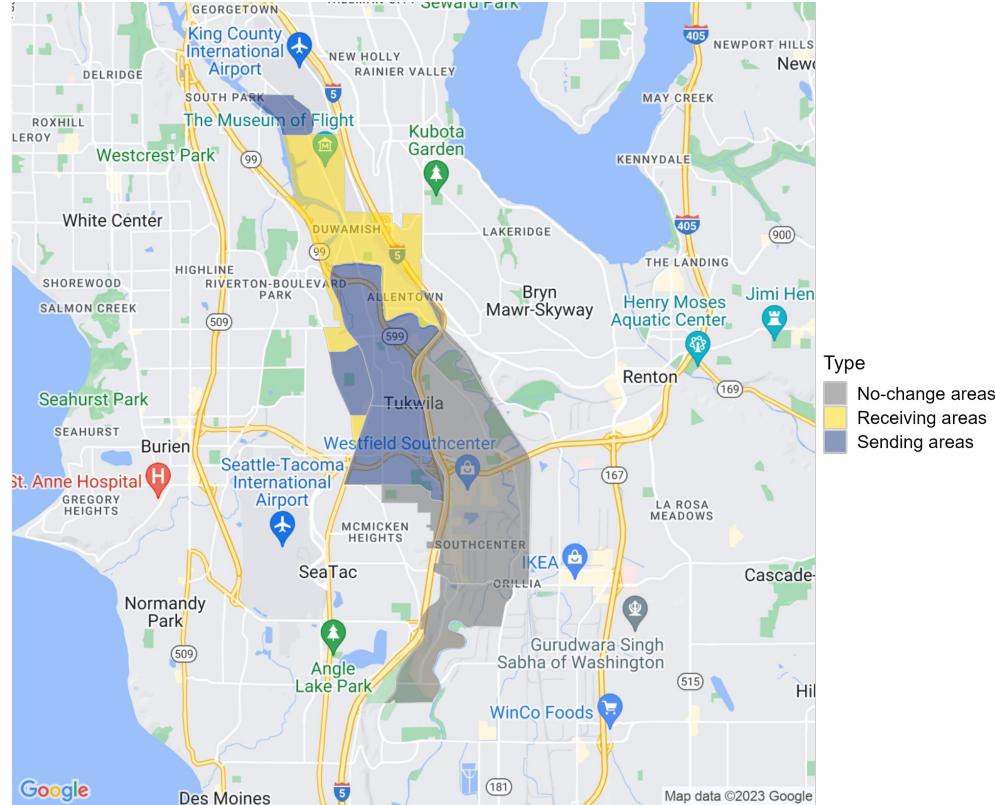
Tukwila

Summary & Next Steps

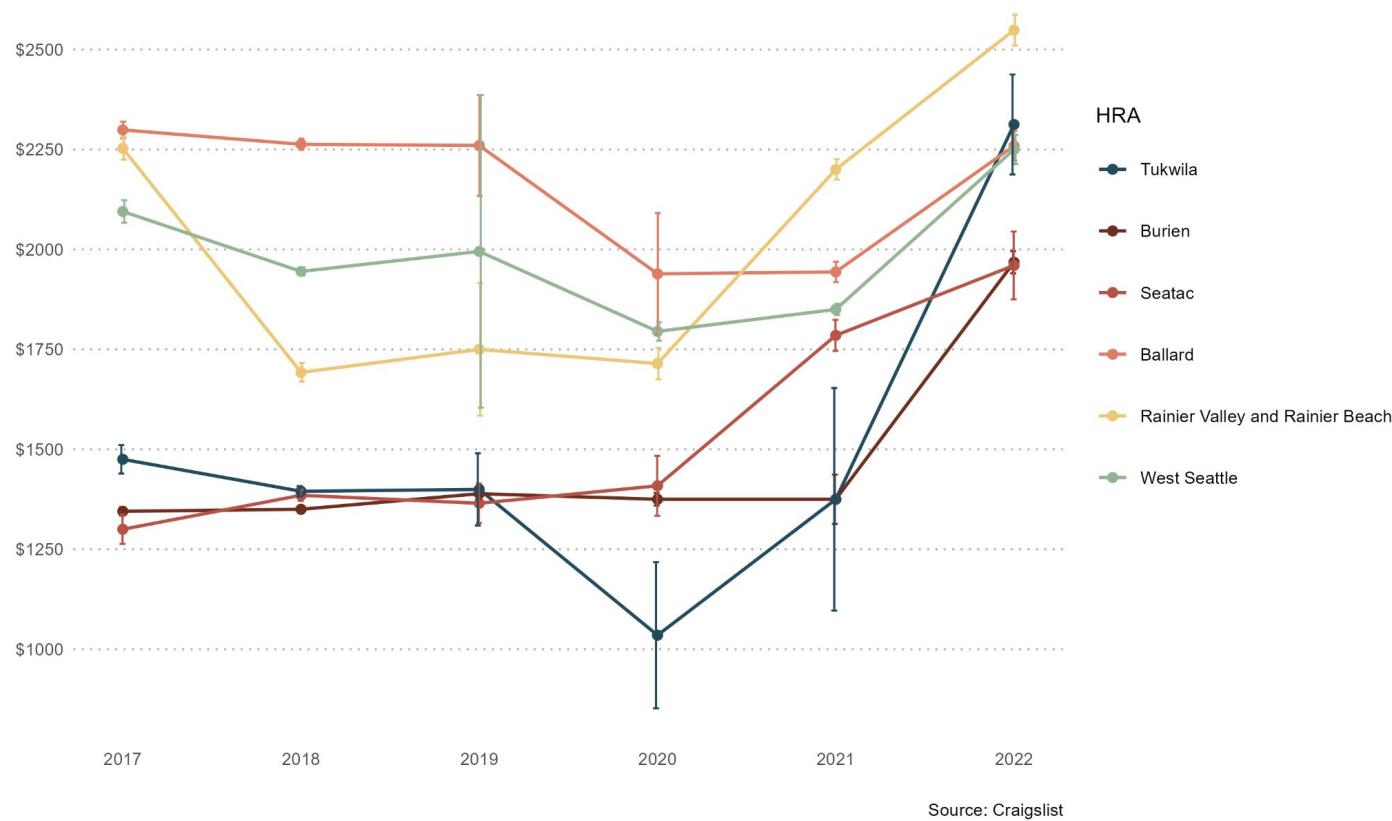
Tukwila was the only HRA in 2017 to see negative net migration



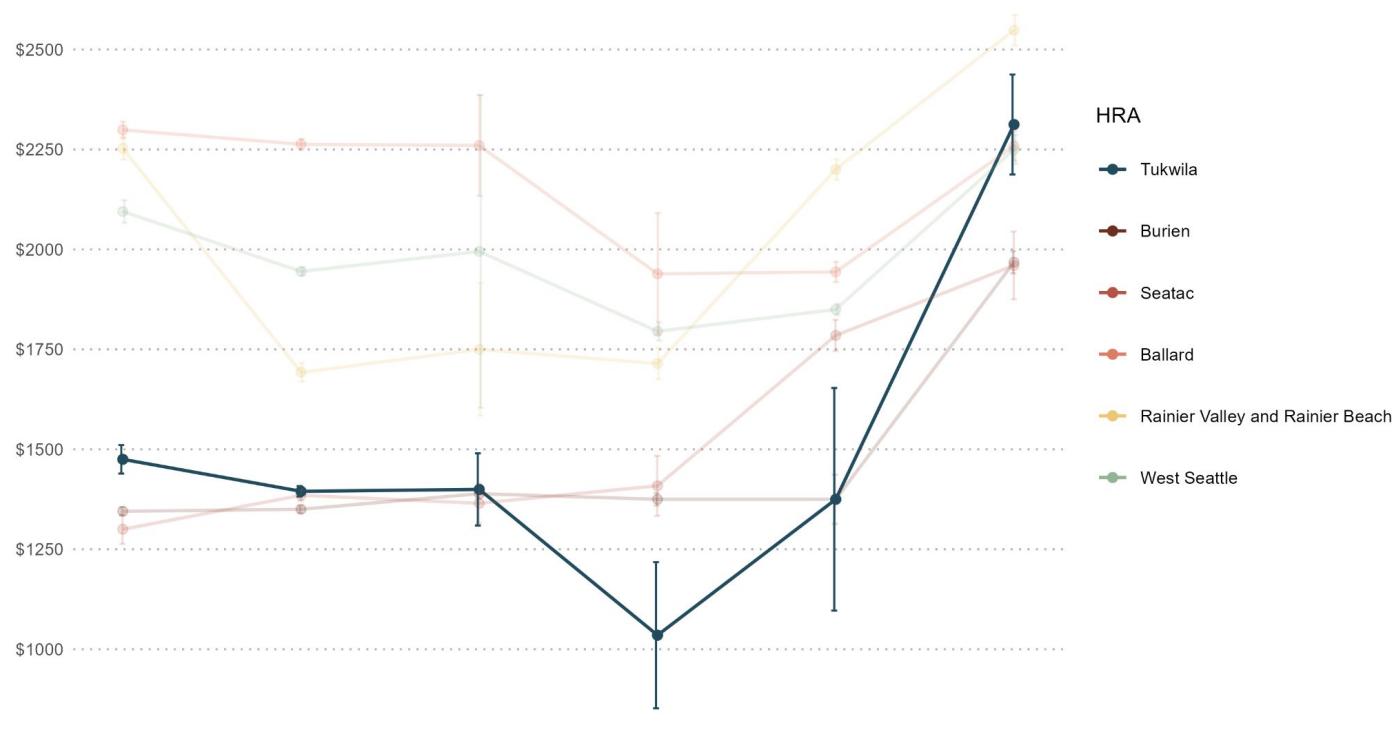
Tract-level variation in net migration in Tukwila



2-bedroom 1Q Rent Prices in Tukwila vs Top Receiving Areas



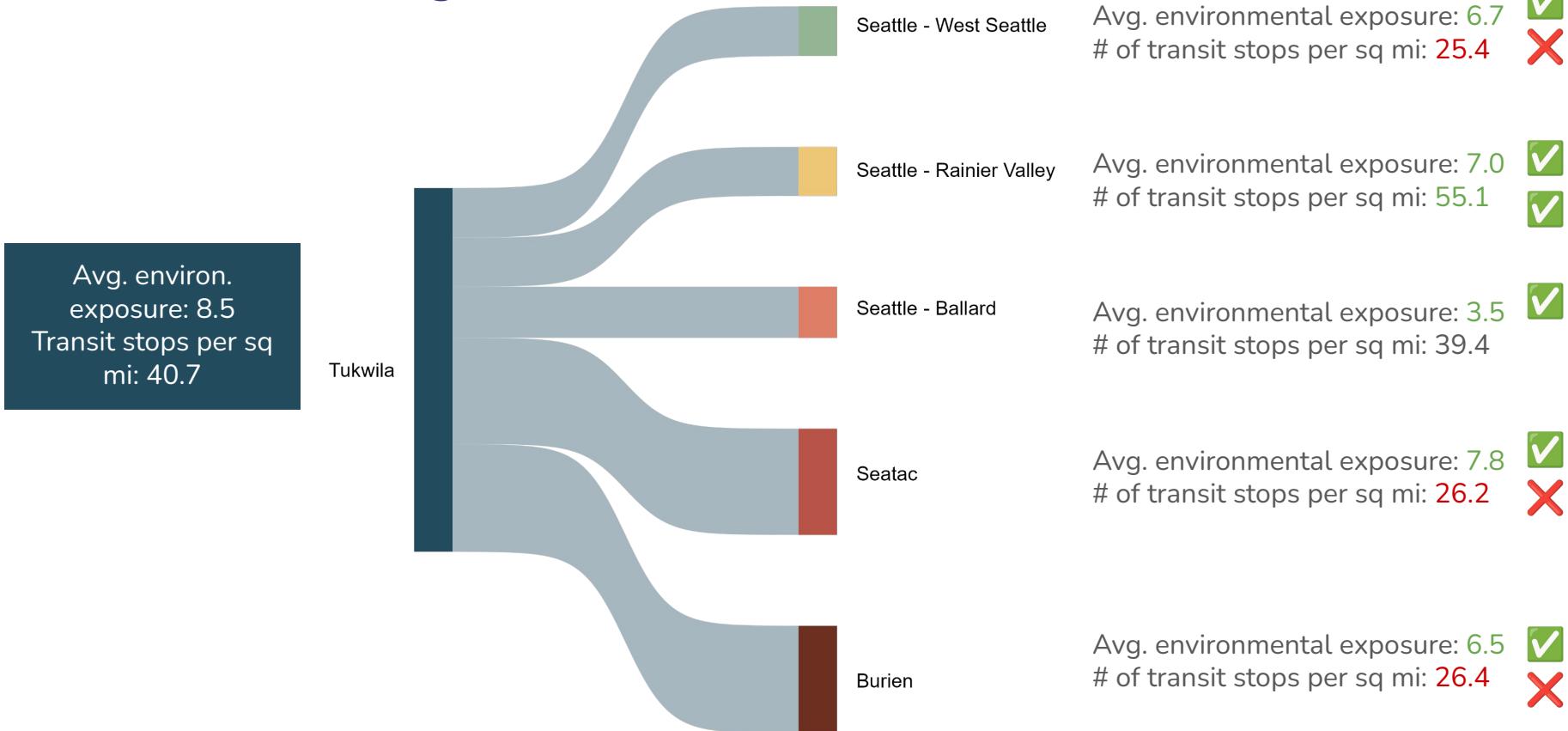
2-bedroom 1Q Rent Prices in Tukwila vs Top Receiving Areas



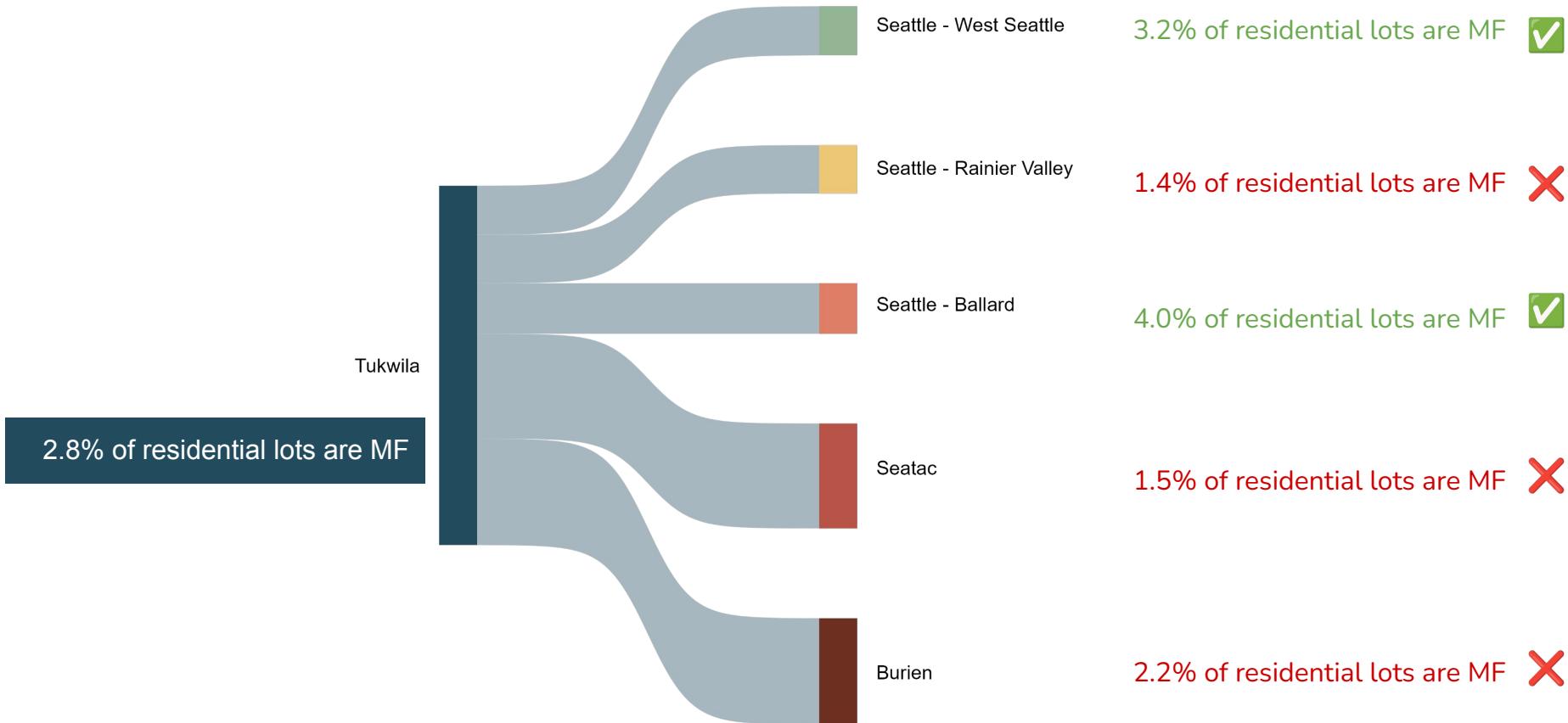
Source: Craigslist



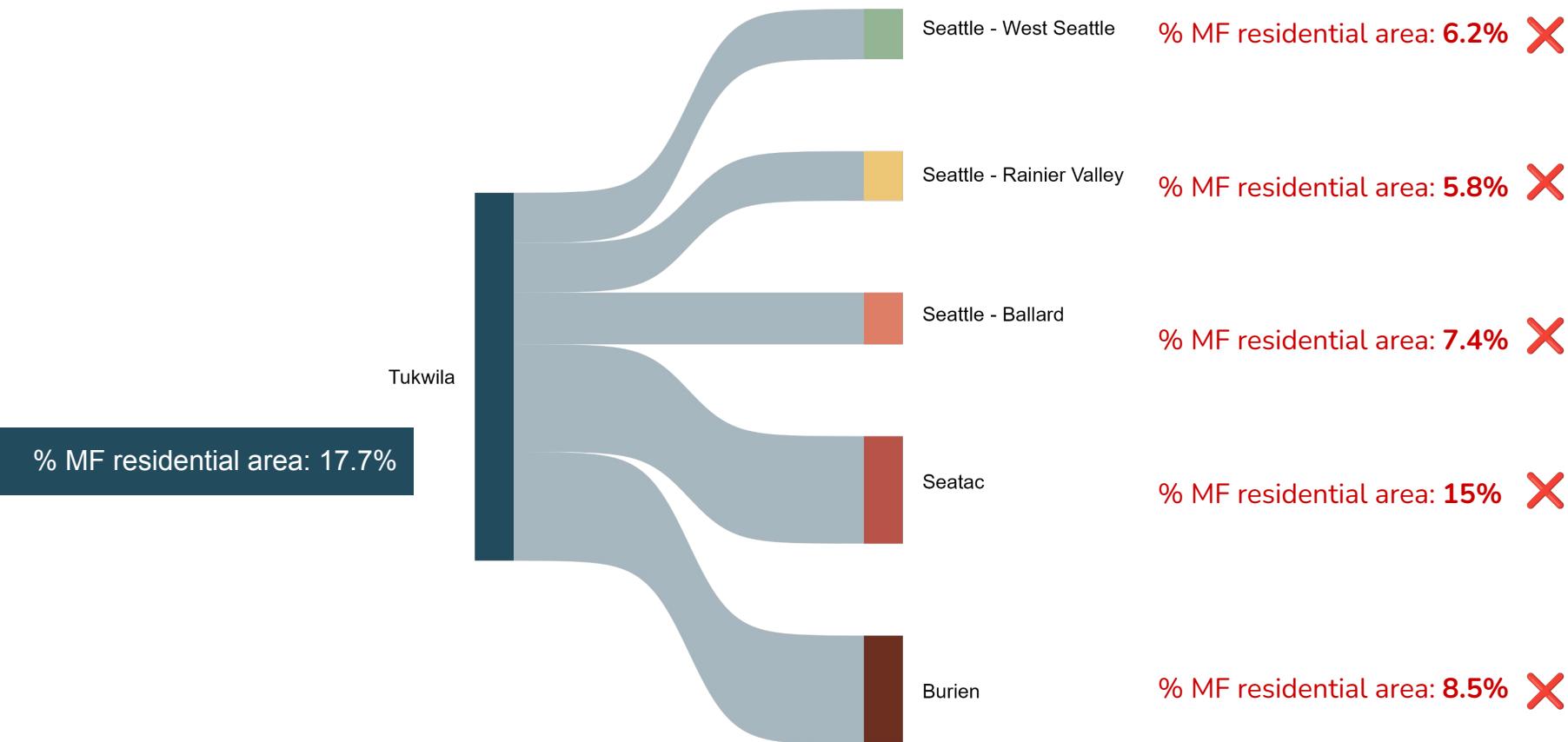
Environmental Exposure and Transit Access in Tukwila vs Receiving Areas



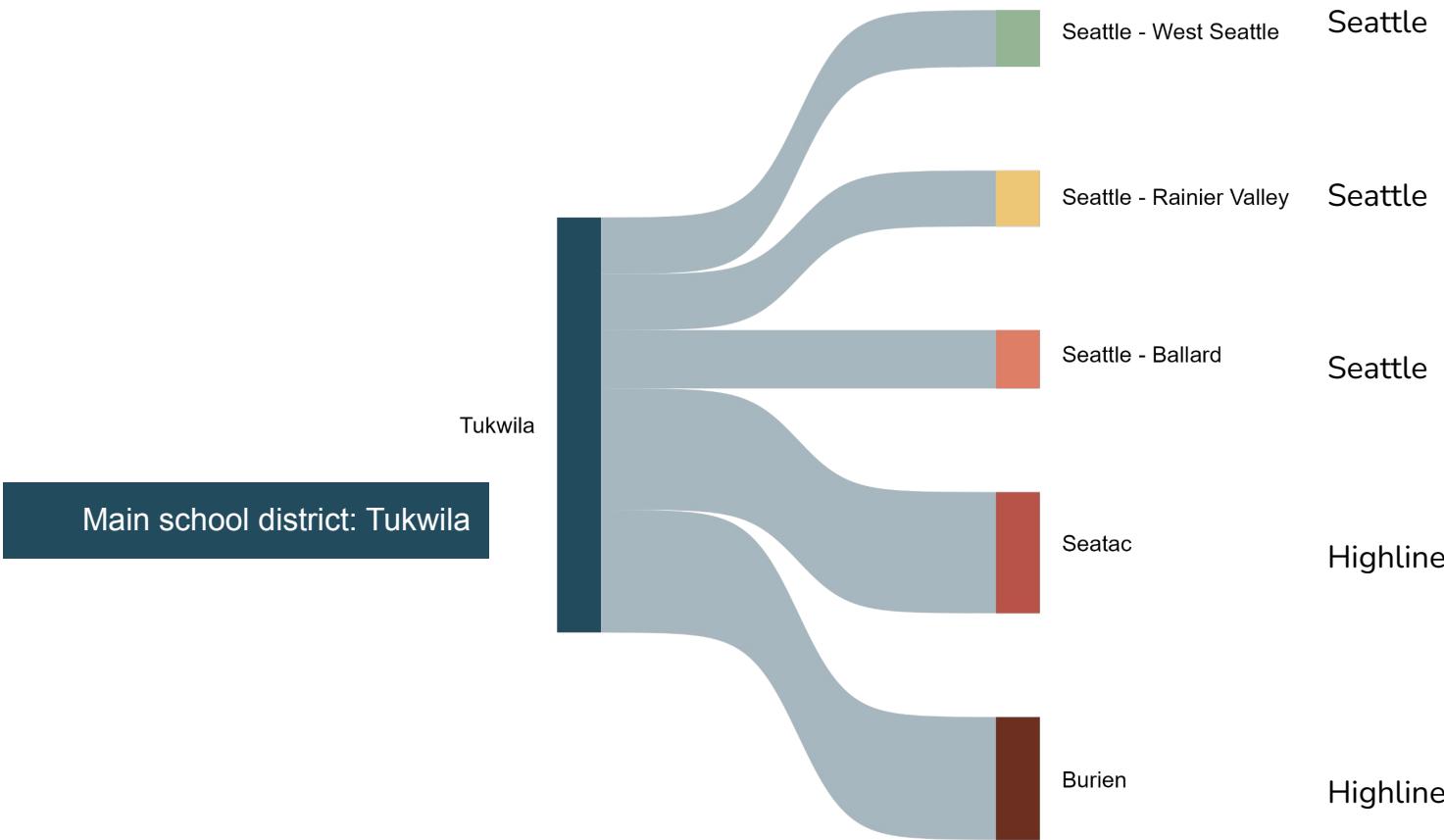
Residential Land Use in Tukwila vs Receiving Areas



Residential Land Use in Tukwila vs Sending Areas: SQFT of lots



Main schools in Tukwila vs Receiving Areas



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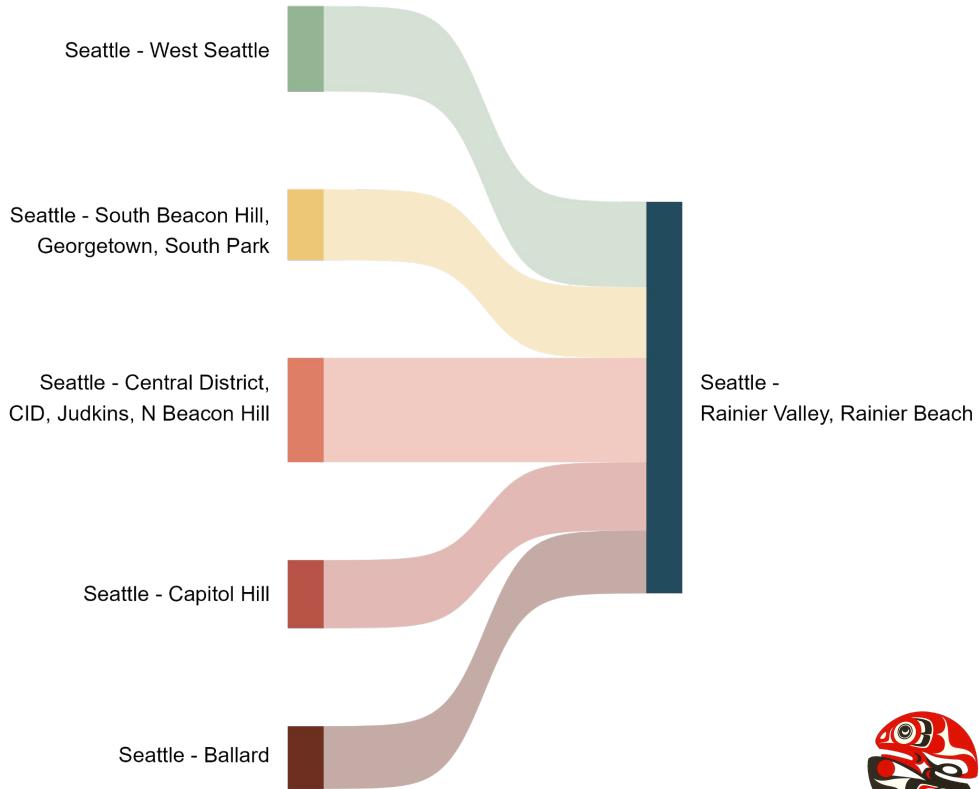
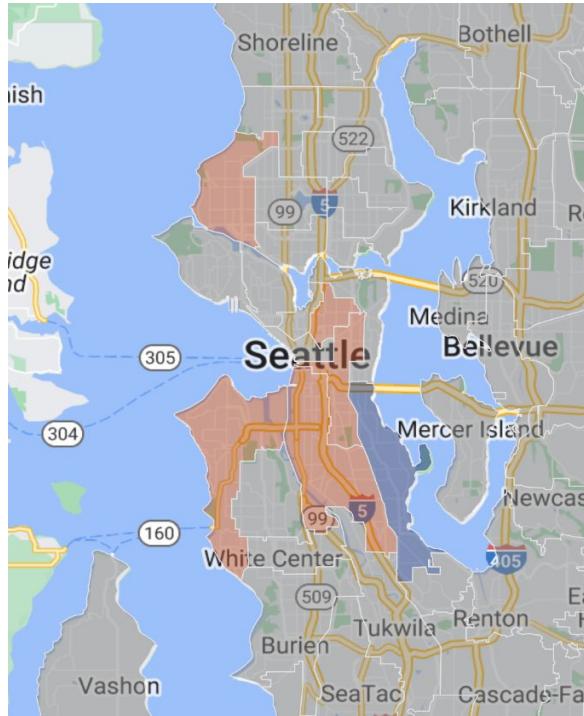
Rainier
Beach

Summary & Next Steps

Where are households in
Rainier Valley-Rainier Beach moving from?



Top 5 Sending Areas to Rainier Valley-Rainier Beach (2017)



Top 5 Sending Areas to Rainier Valley-Rainier Beach (2018-2020)

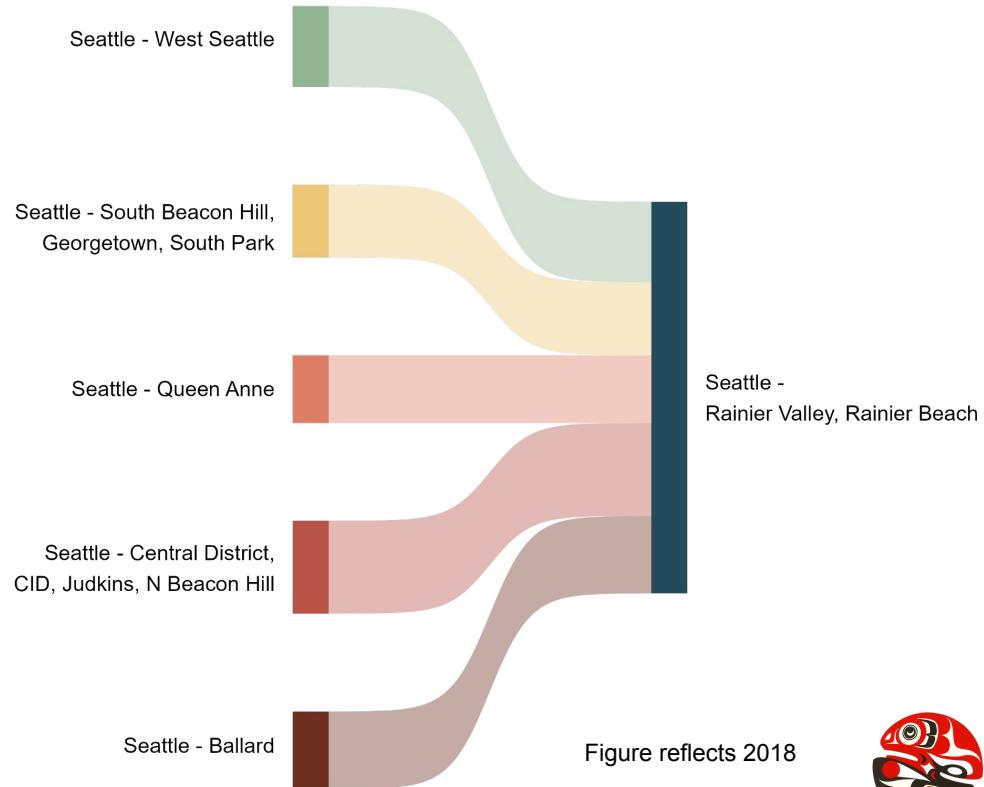
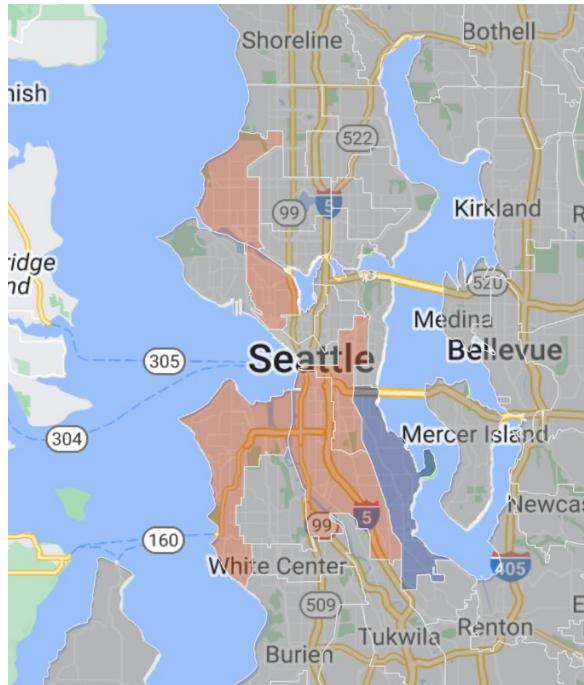
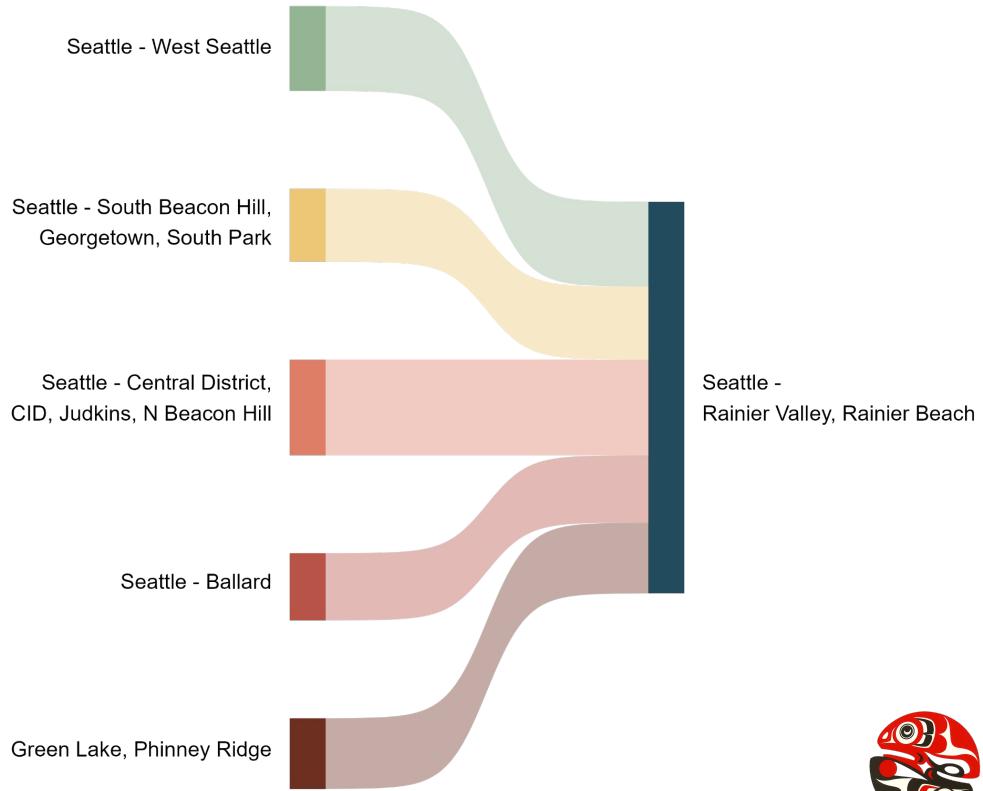
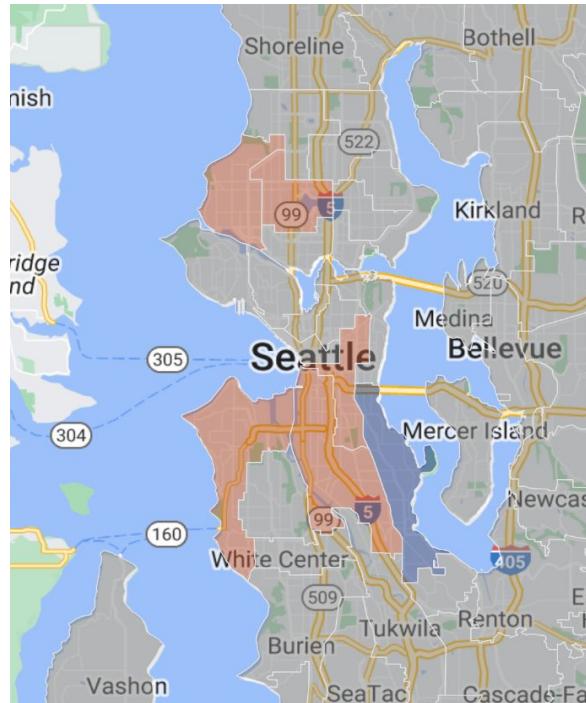


Figure reflects 2018



Top 5 Sending Areas to Rainier Valley-Rainier Beach (2021)



Where are households in
Rainier Valley-Rainier Beach moving to?



Top 5 Receiving Areas from RVRB (2017-2021)

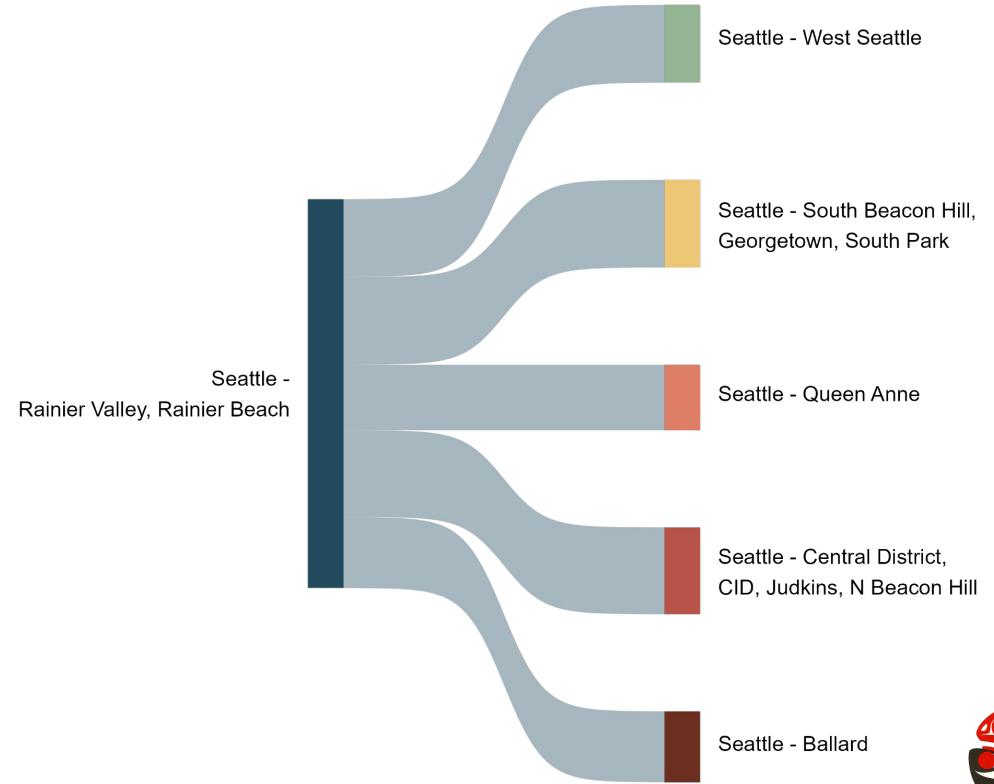
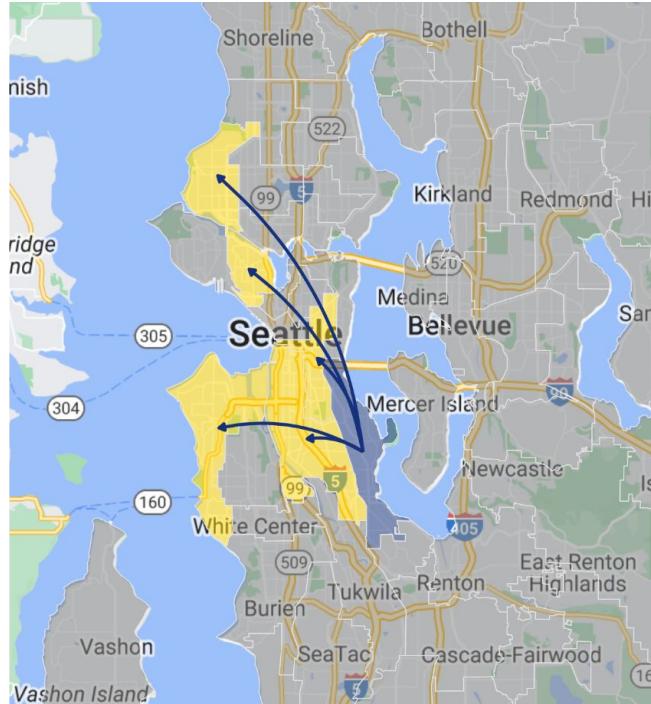
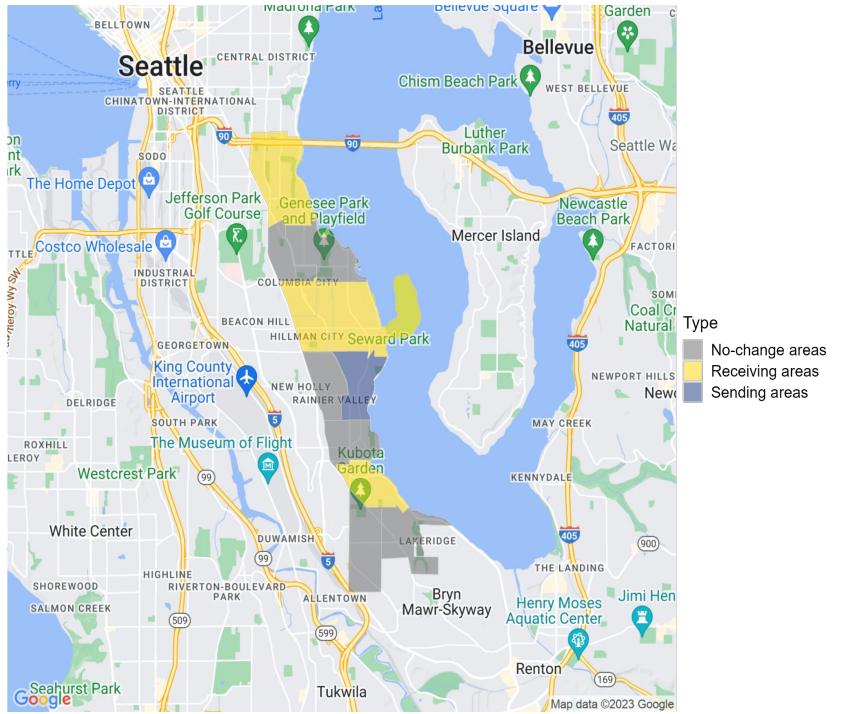


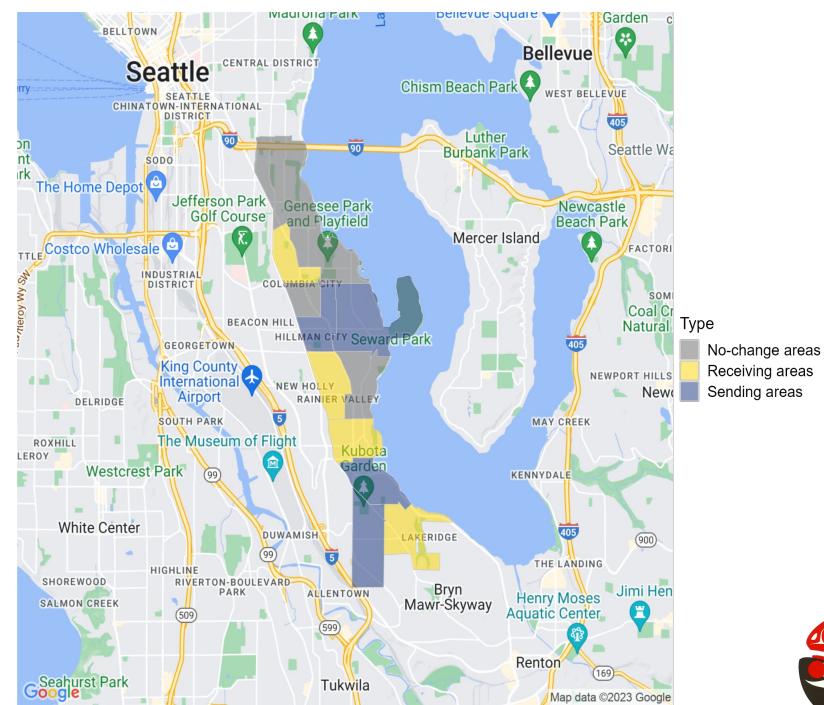
Figure reflects 2017

Tract-level variation net migration in RVRB

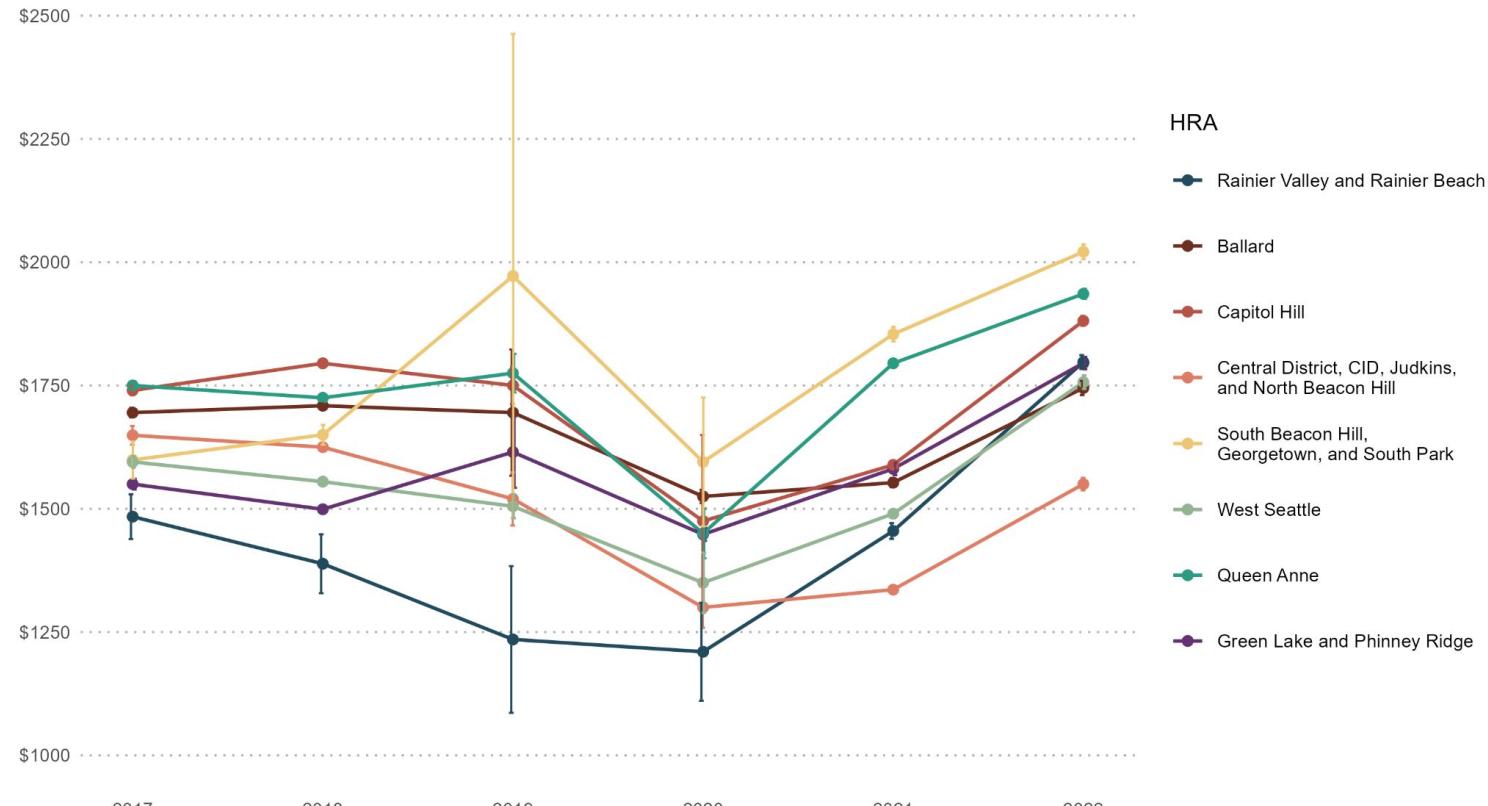
2017



2020

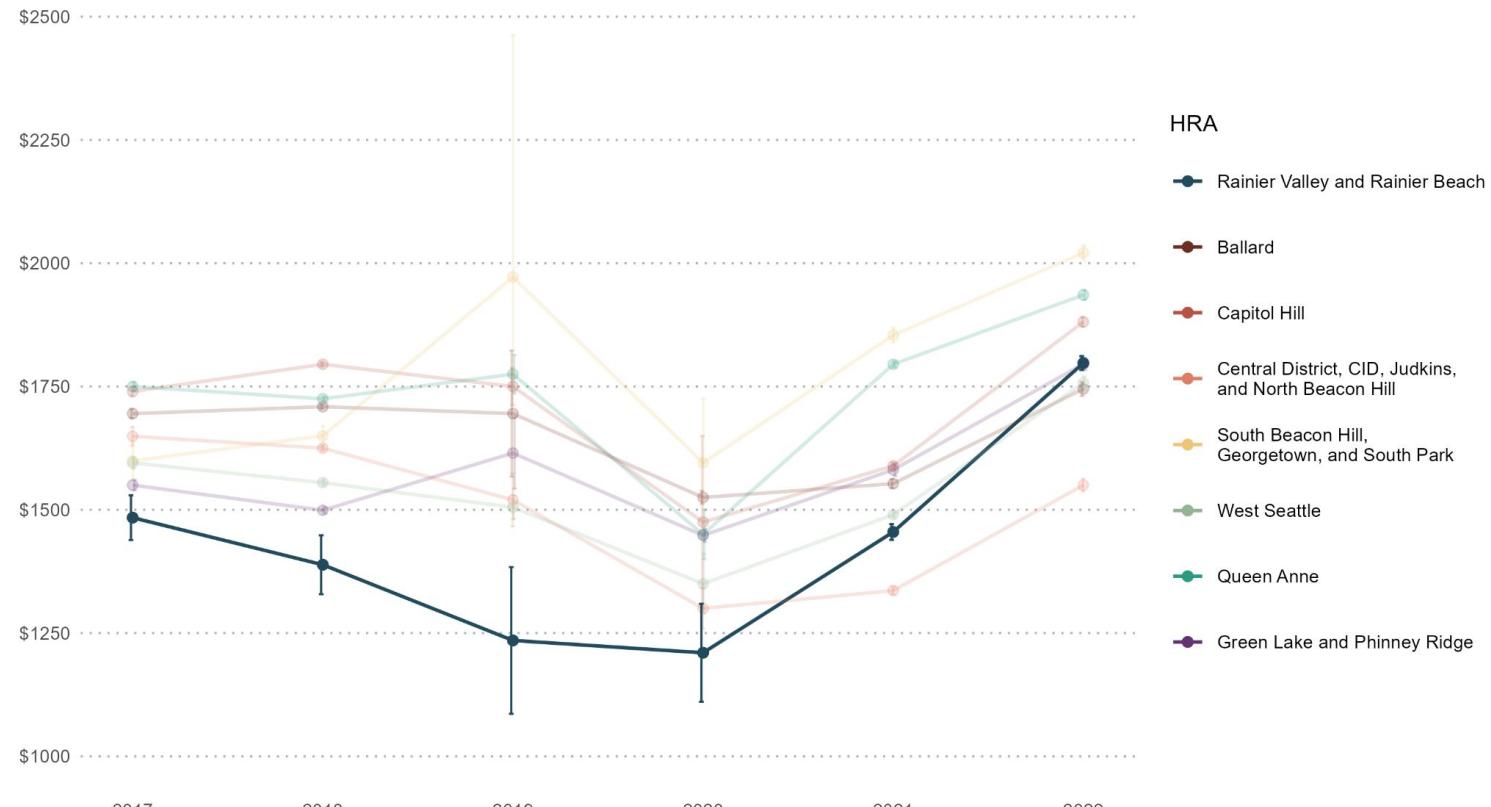


1BR 1Q Rent Prices in RVRB in Sending and Receiving Areas



Source: Craigslist

RVRB Rents were the lowest pre-2020 but have since increased rapidly



Source: Craigslist

RVRB has moderate average levels of environmental exposure and number of transit stops compared to its sending areas

Avg environmental exposure: 6.7

of transit stops per sq mi: 25.4



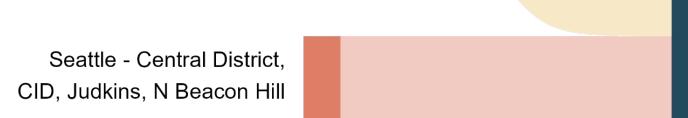
Avg environmental exposure: 7.2

of transit stops per sq mi: 68.2



Avg environmental exposure: 6.4

of transit stops per sq mi: 152.7



Avg environmental exposure: 3.5

of transit stops per sq mi: 39.4



Avg environmental exposure: 7.5

of transit stops per sq mi: 175.2

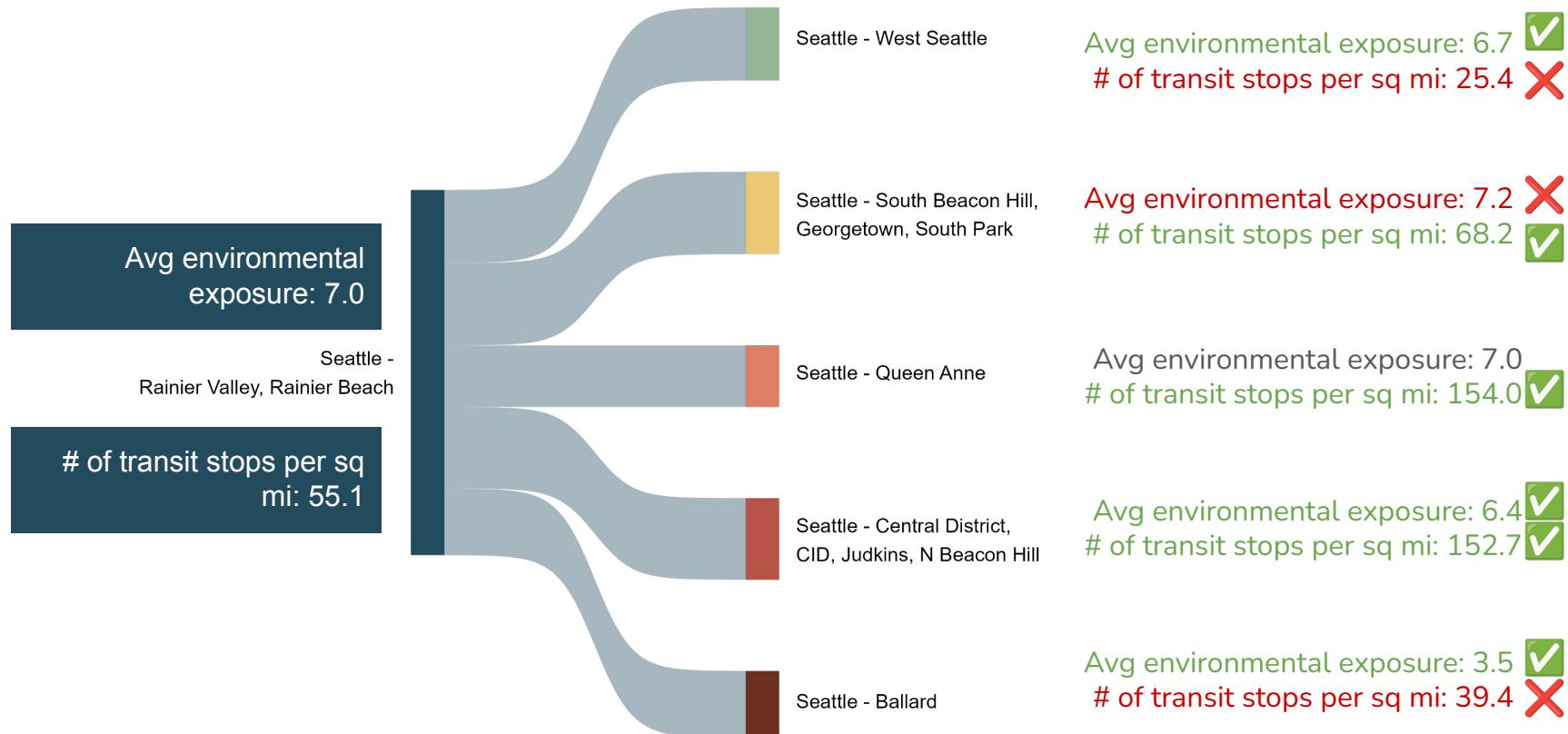


Avg environmental exposure: 7.0

of transit stops per sq mi: 55.1



RVRB has moderate average levels of environmental exposure and number of transit stops compared to its receiving areas



RVRB has the lowest proportion of multifamily housing compared to its sending areas

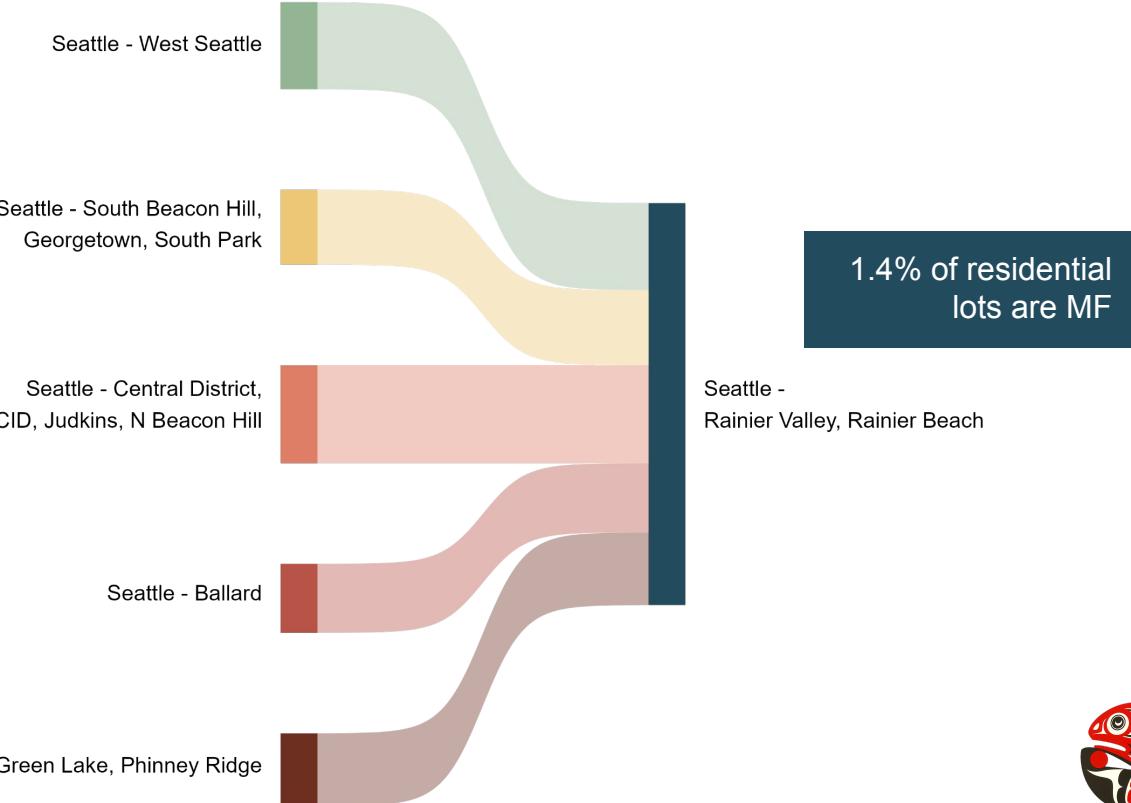
3.2% of residential lots are MF

1.7% of residential lots are MF

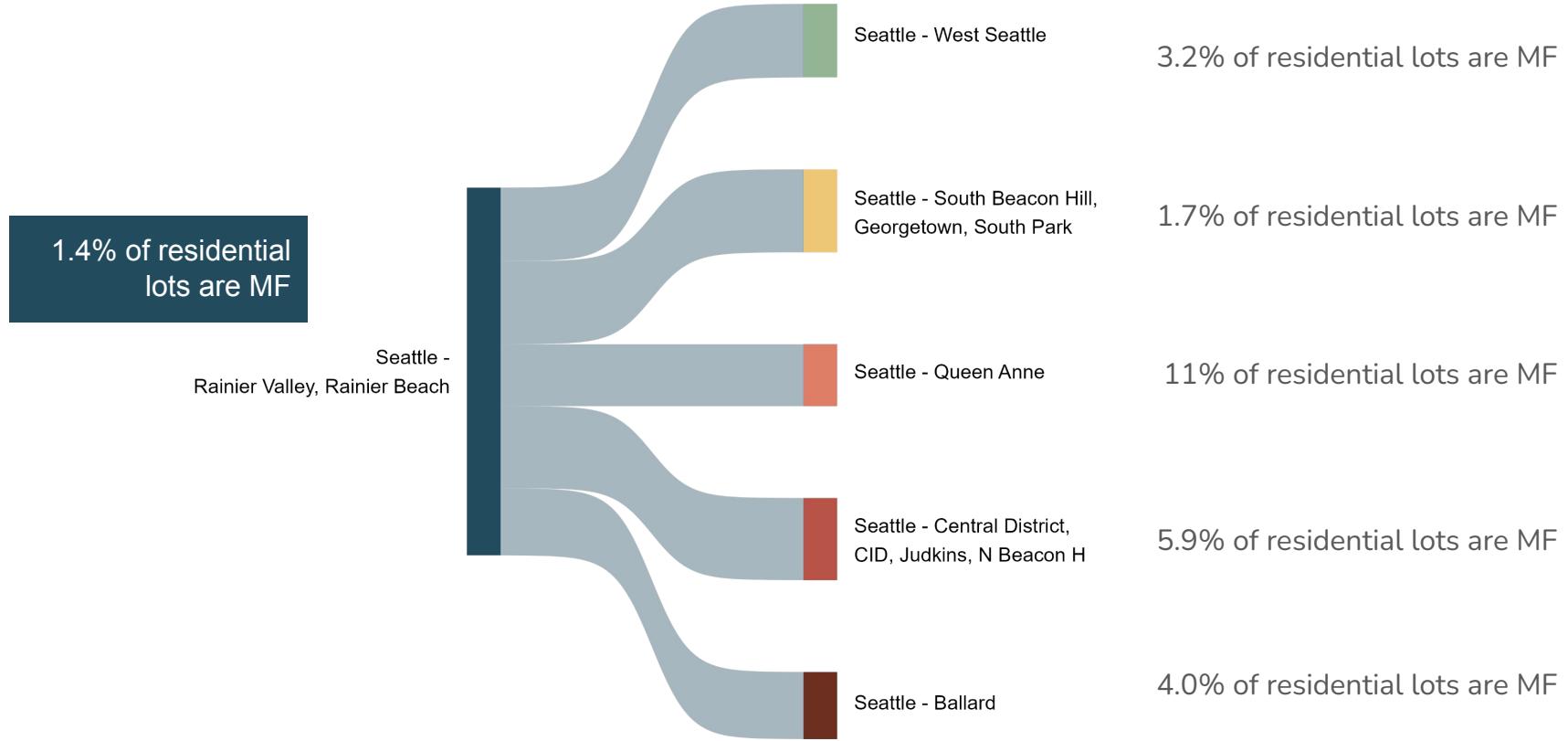
5.9% of residential lots are MF

4.0% of residential lots are MF

3.8% of residential lots are MF



RVRB has the lowest proportion of multifamily housing compared to its receiving areas



Outline

Project Background

Research Questions

Data Sources

Measuring Migration

County-level Results

Area-level Results

Summary & Next Steps

Key findings

- ❖ Data Axle can reveal the relative order of migration magnitudes and rates
 - Underrepresented: Younger households and renters
- ❖ Most observed internal migration is hyperlocal
 - Most observed migration is likely not displacement (East King County musical chairs)
- ❖ A vast majority of HRAs see net migration gains
 - 1-2 HRAs each year still see net losses (e.g., Tukwila in 2017)
 - Within a given HRA, there is variation in net migration changes across tracts
- ❖ Popular observed origin-destination HRA pairs are often consistent across time
- ❖ Rising rents don't seem to precede observed out-migration

W

Next steps

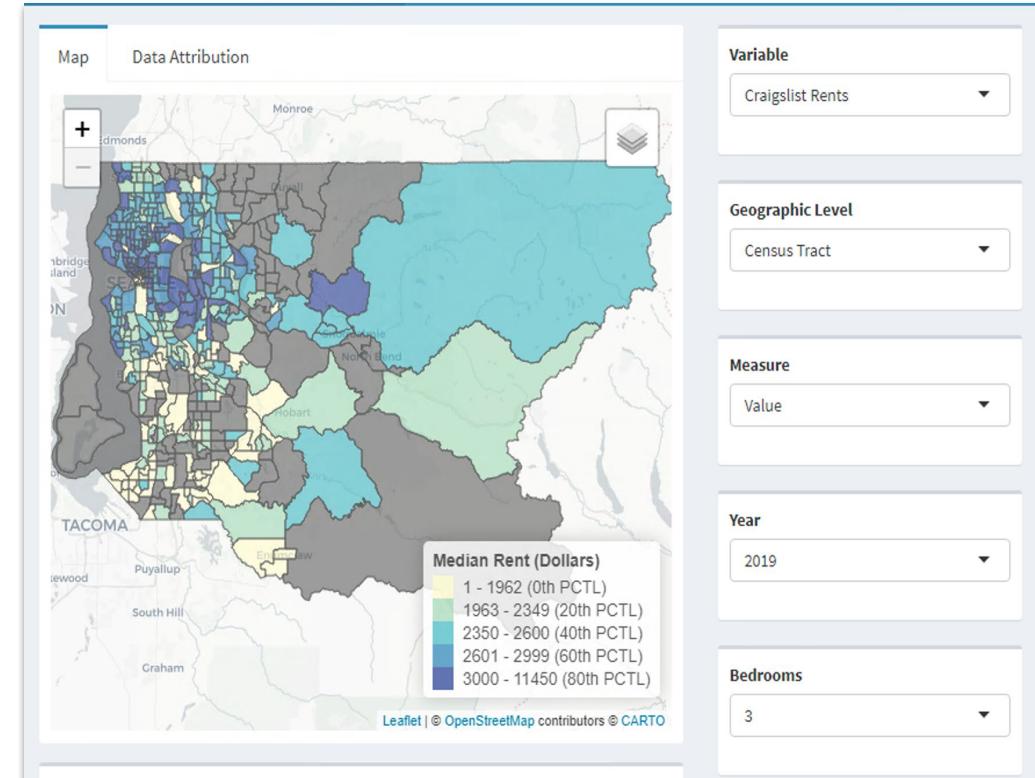
- ❖ Calibrate distributions of households from DataAxe to ACS by tenure and/or age
- ❖ Estimate area-level migration measures by household tenure
- ❖ Estimate migration between King, Pierce, and Snohomish County
- ❖ Incorporate area-level migration measures into Exploring King County tool from previous years



Exploring King County: Our Populations & Households

❖ Variables of Interest

- Population
- Education Level
- Median Income
- Median Rent
- Rent Burden
- Methods of Transportation to Work
- Number of Occupants per Room
- Household Size
- Housing Units by # BRs
- Rents (SORL)**
- Area-level Migration (DataAxle)**



<https://rsc.csde.washington.edu/kc-population-and-households/>

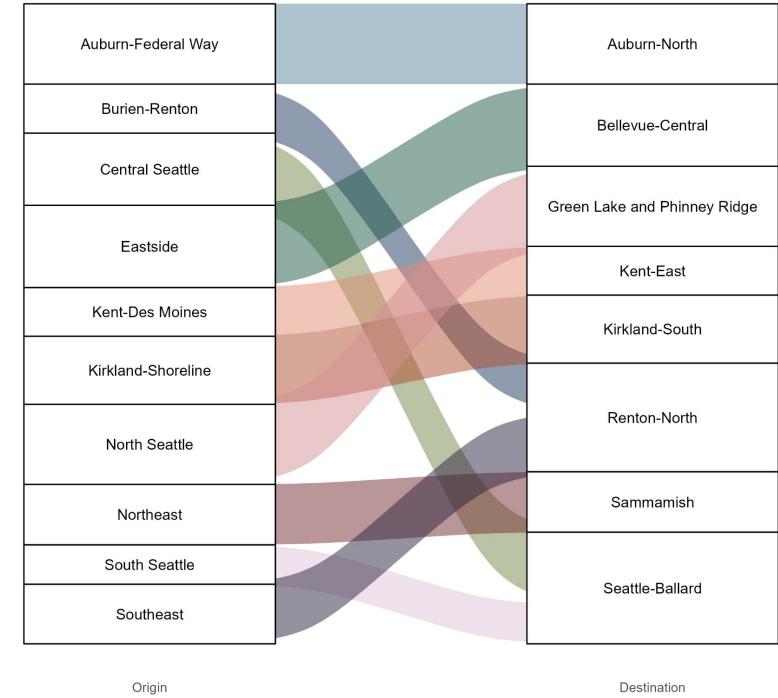
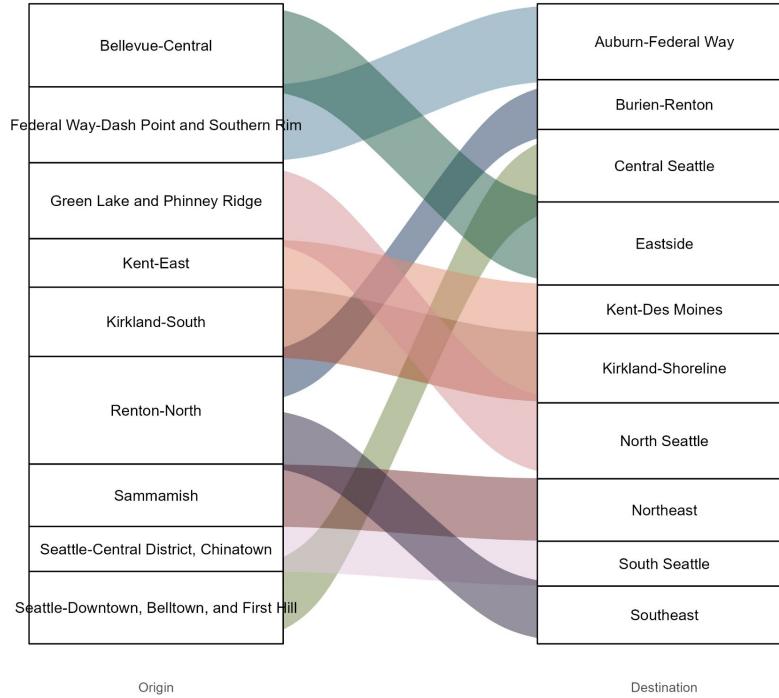
Thank you!

Questions?

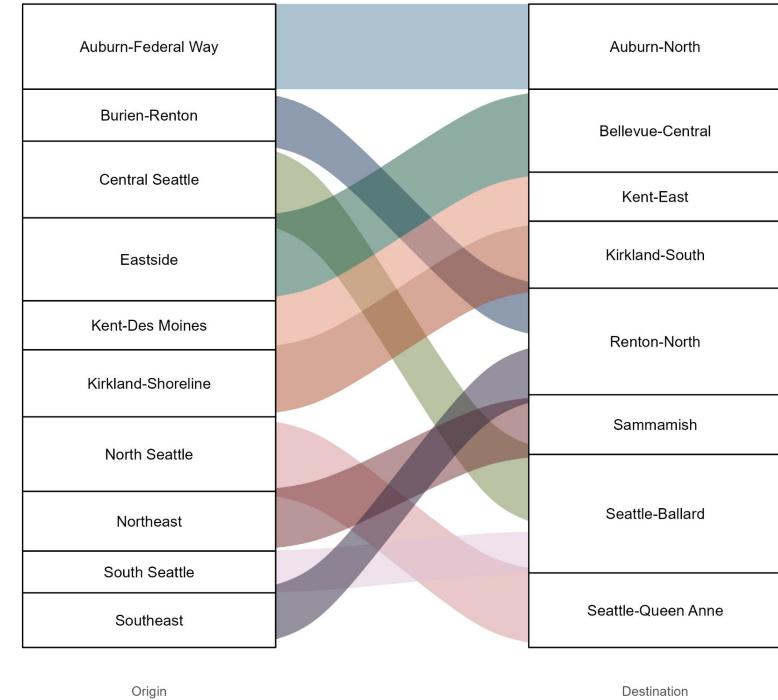
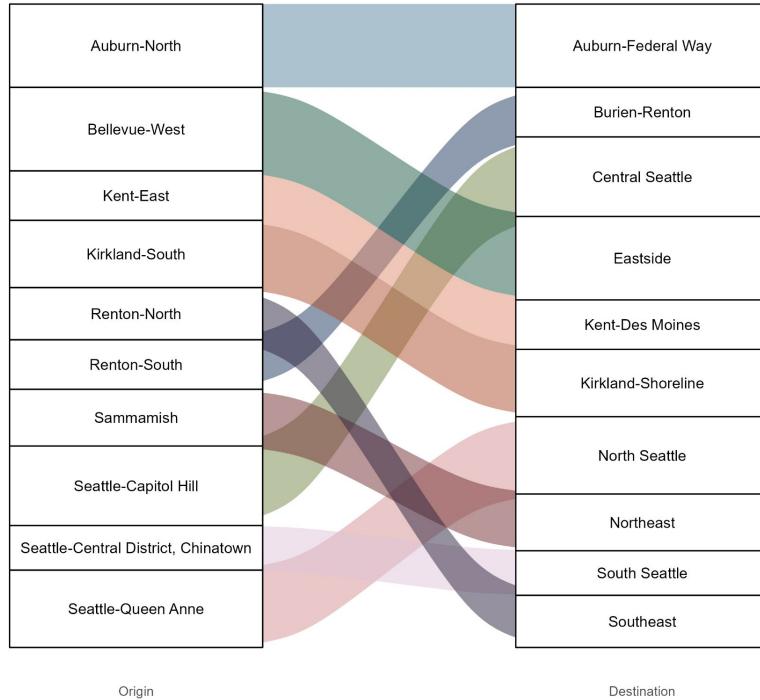
Appendix

- [HRA10 top migration flows](#)
- [Net negative migration HRAs](#)
- [Rent change - Outflow rate scatter plots](#)

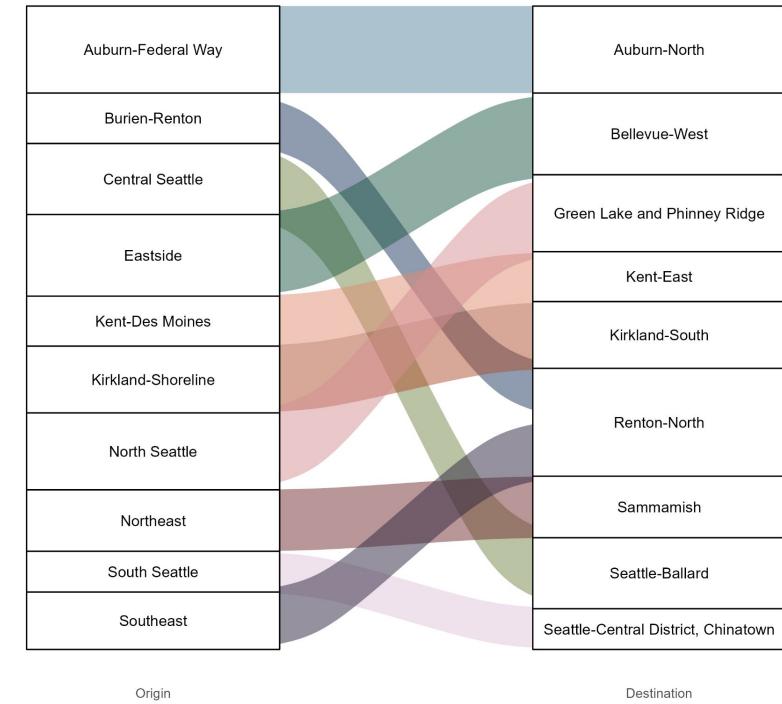
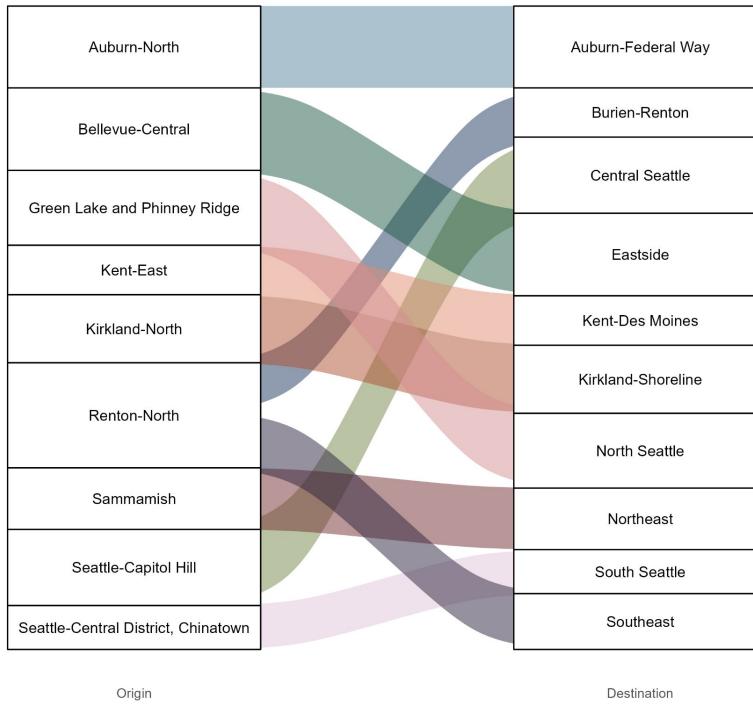
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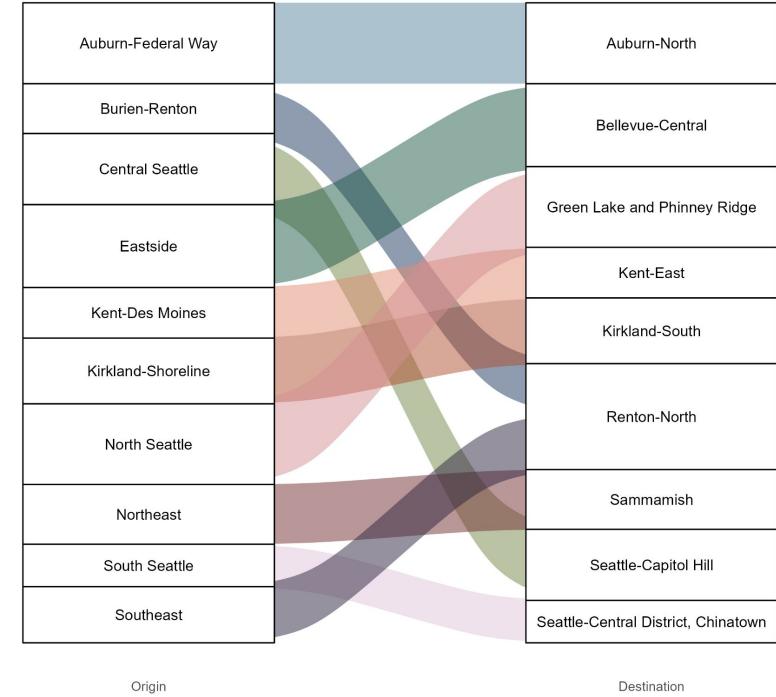
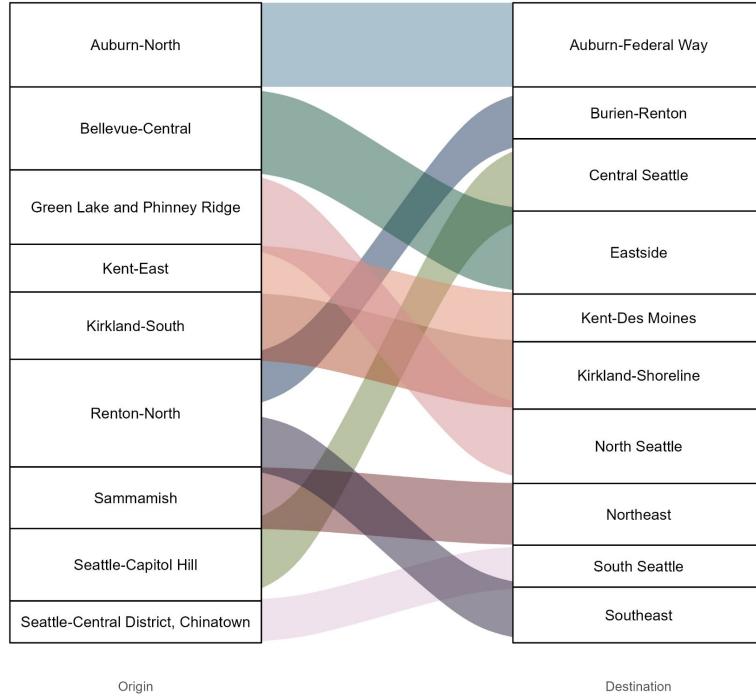
Migration flows: 2018



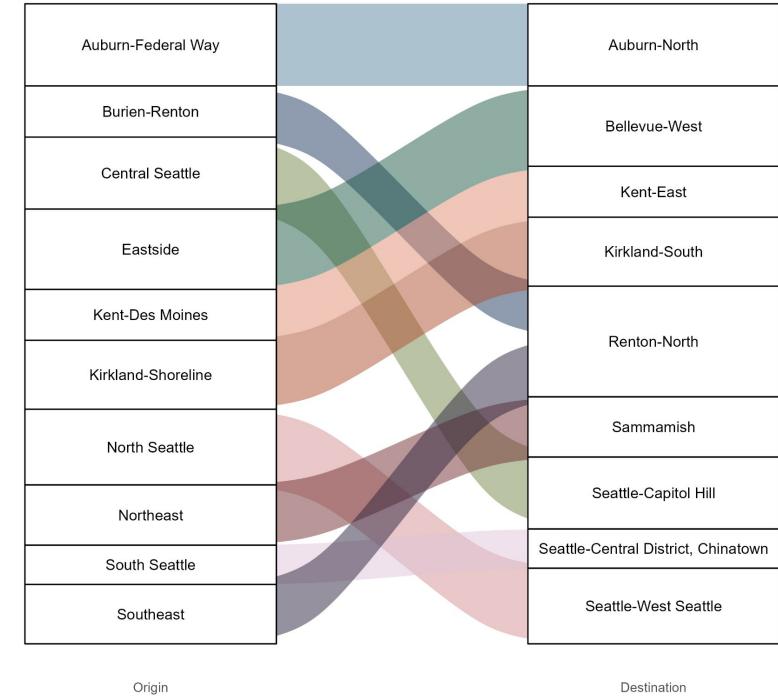
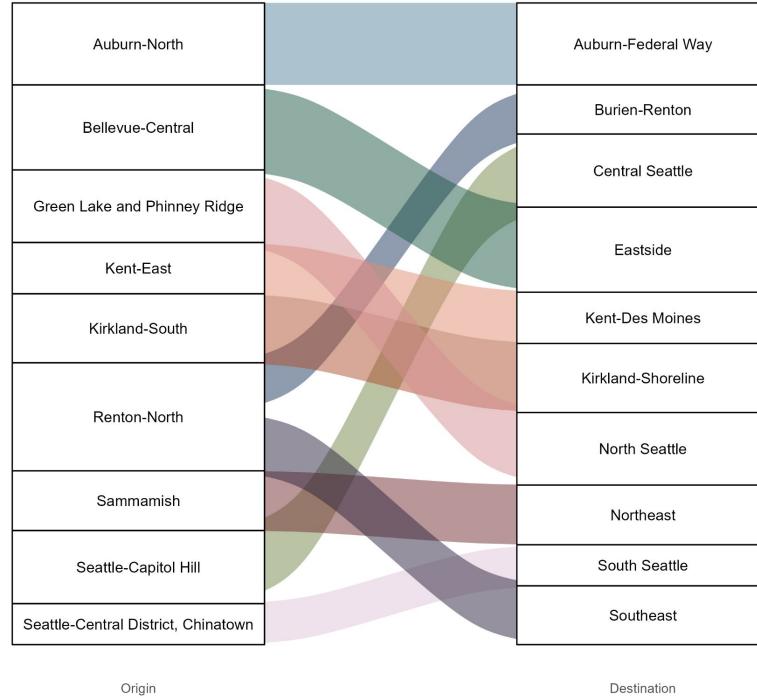
Migration flows: 2019



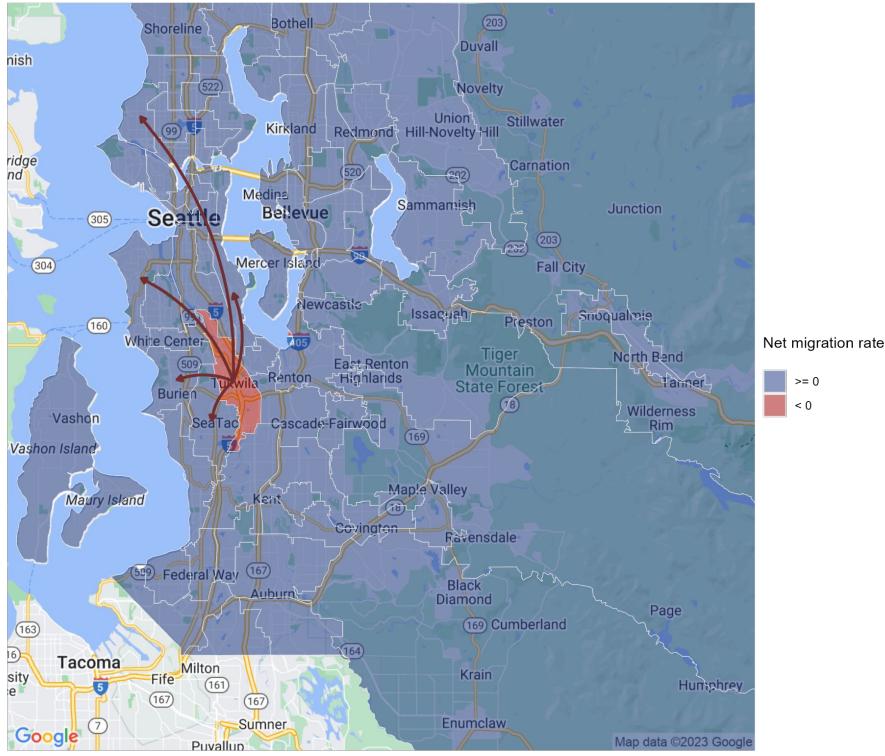
Migration flows: 2020



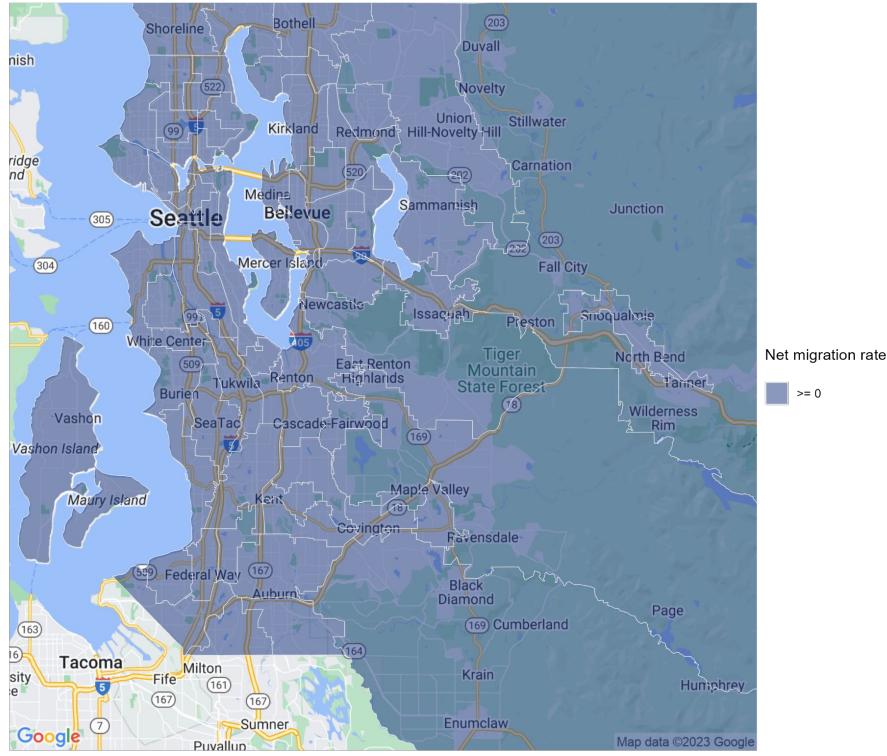
Migration flows: 2021



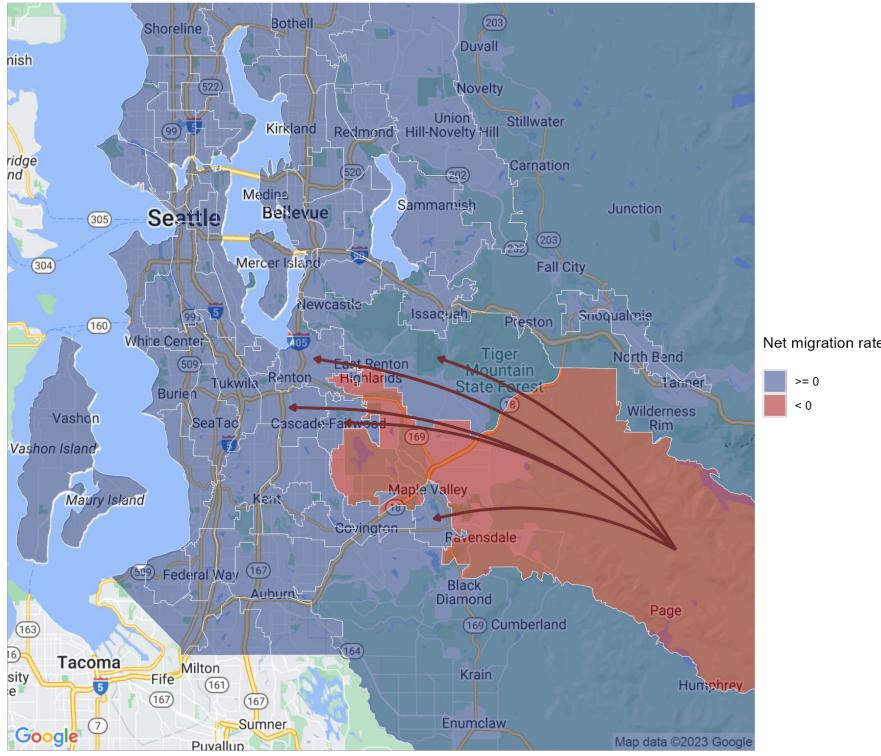
HRAs with negative net-migration rates: 2017



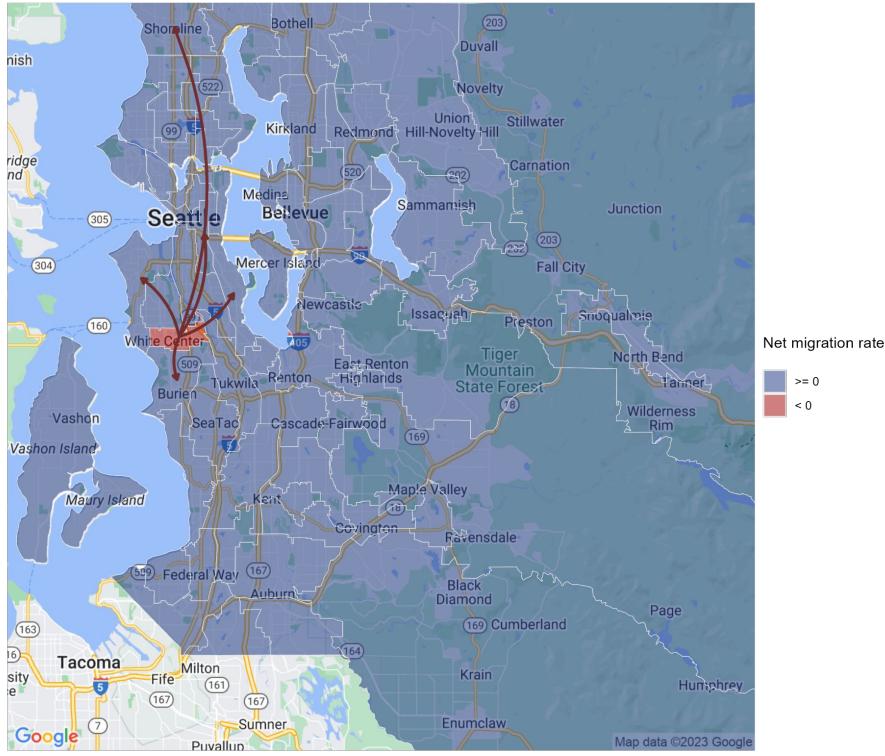
HRAs with negative net-migration rates: 2018



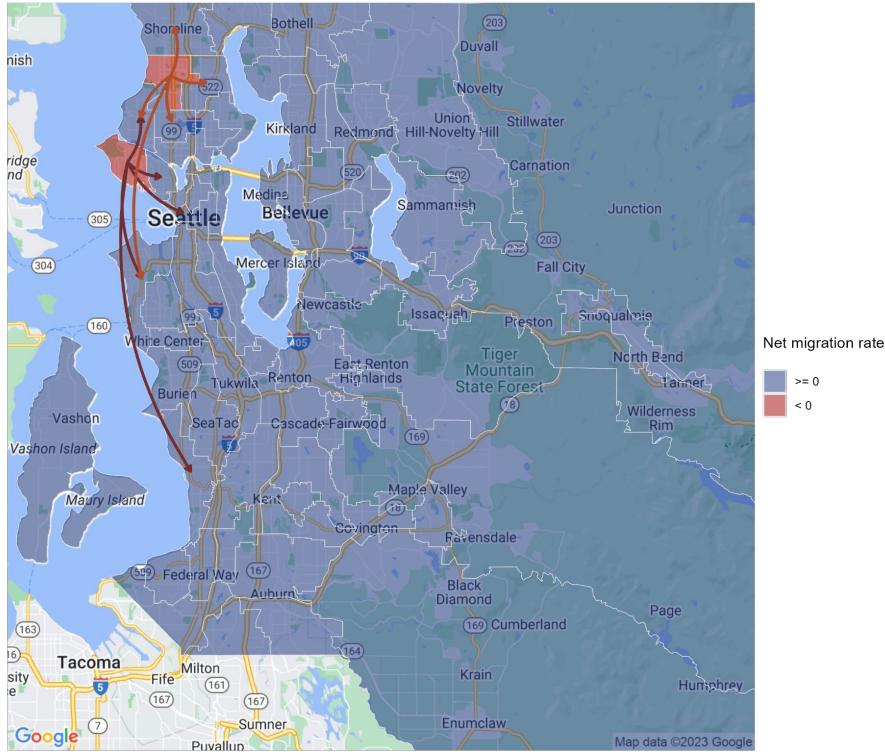
HRAs with negative net-migration rates: 2019



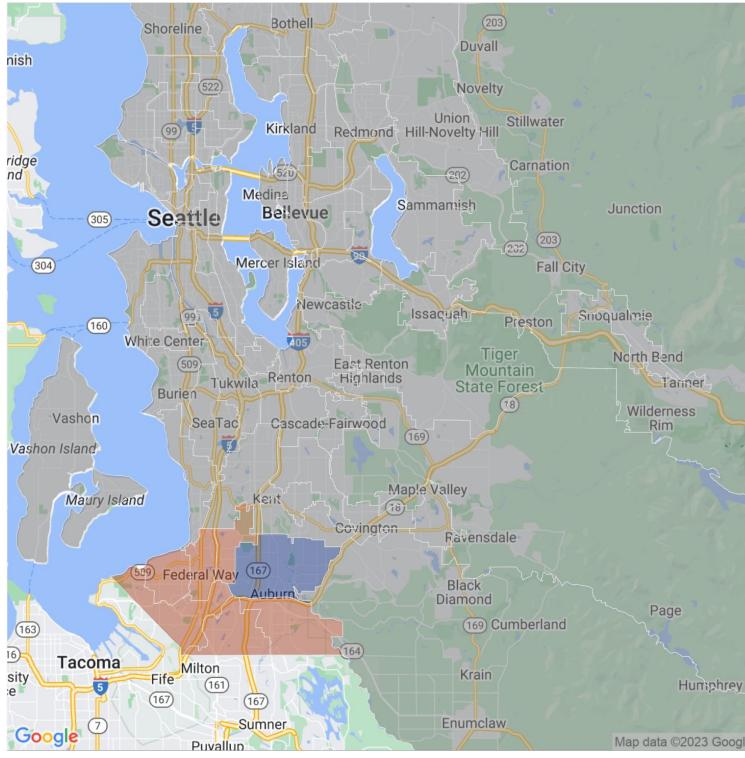
HRAs with negative net-migration rates: 2020



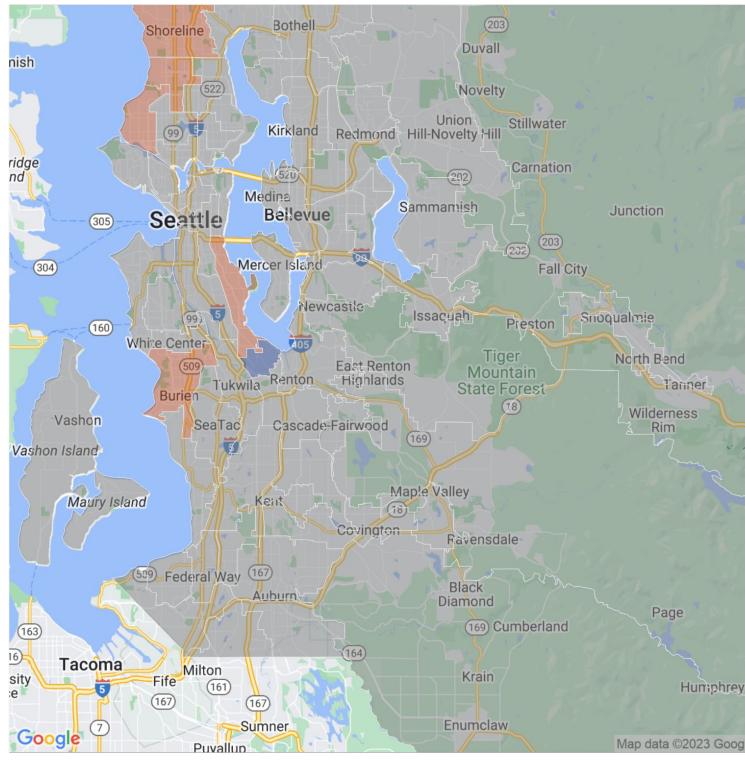
HRAs with negative net-migration rates: 2021



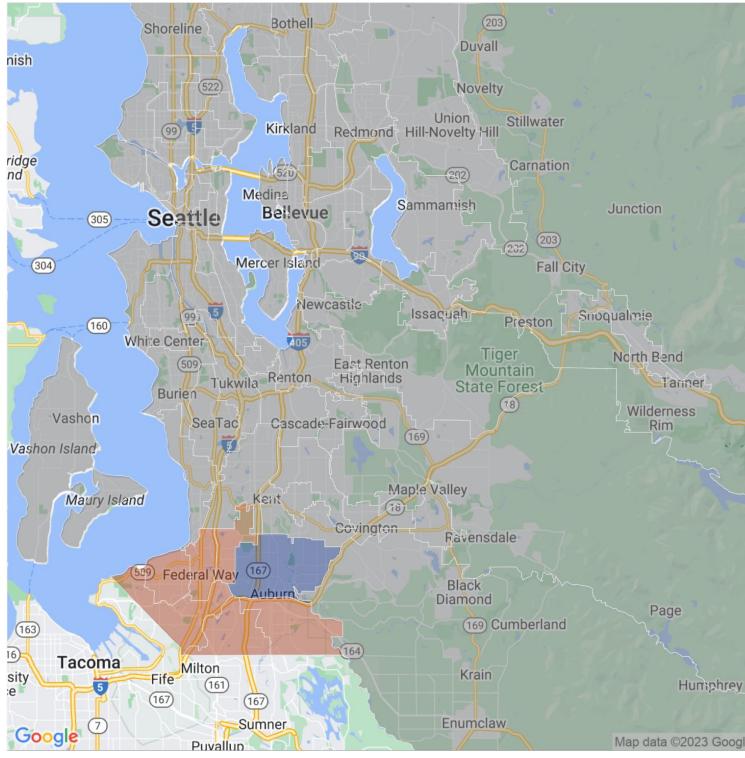
HRAs with the largest net-migration rate: 2017



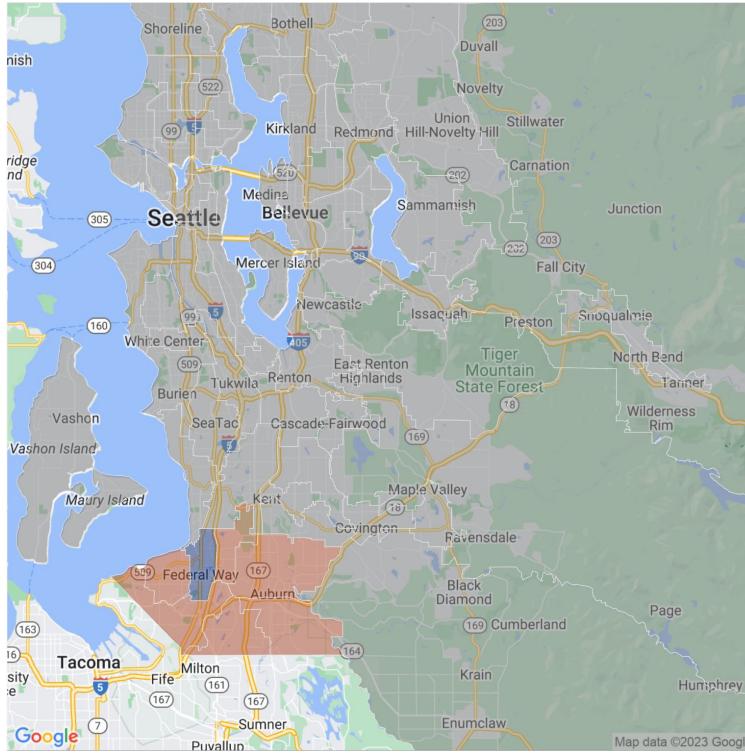
HRAs with the largest net-migration rate: 2018



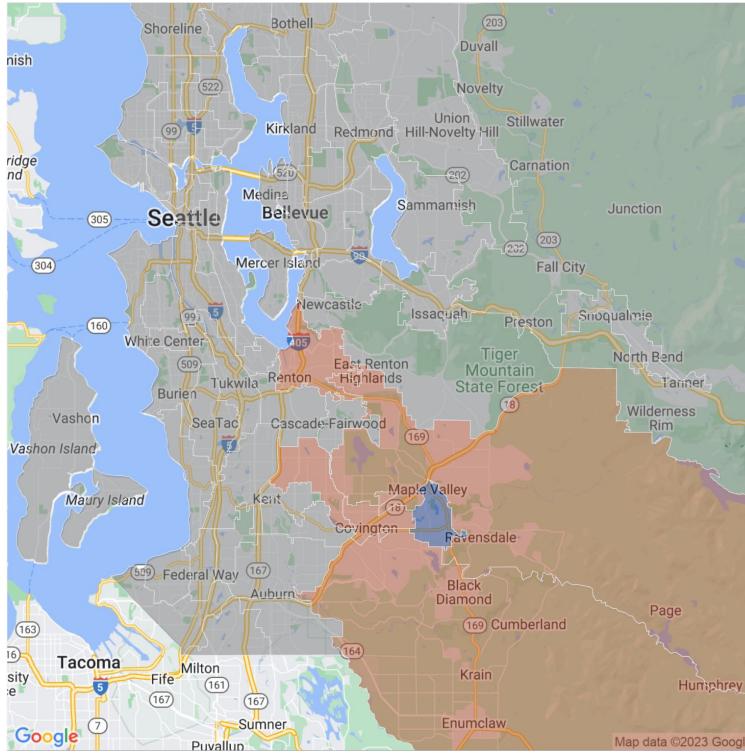
HRAs with the largest net-migration rate: 2019

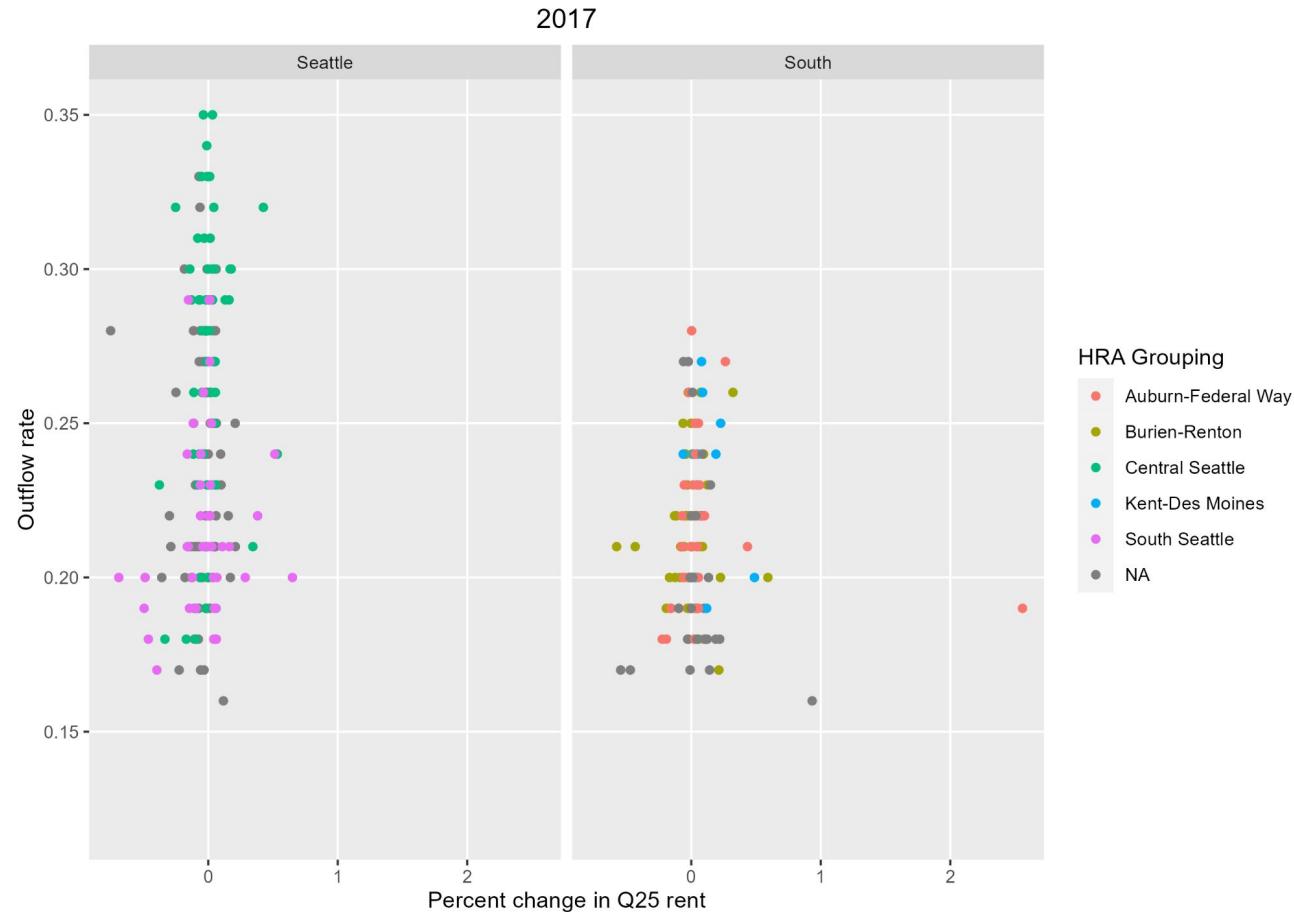


HRAs with the largest net-migration rate: 2020

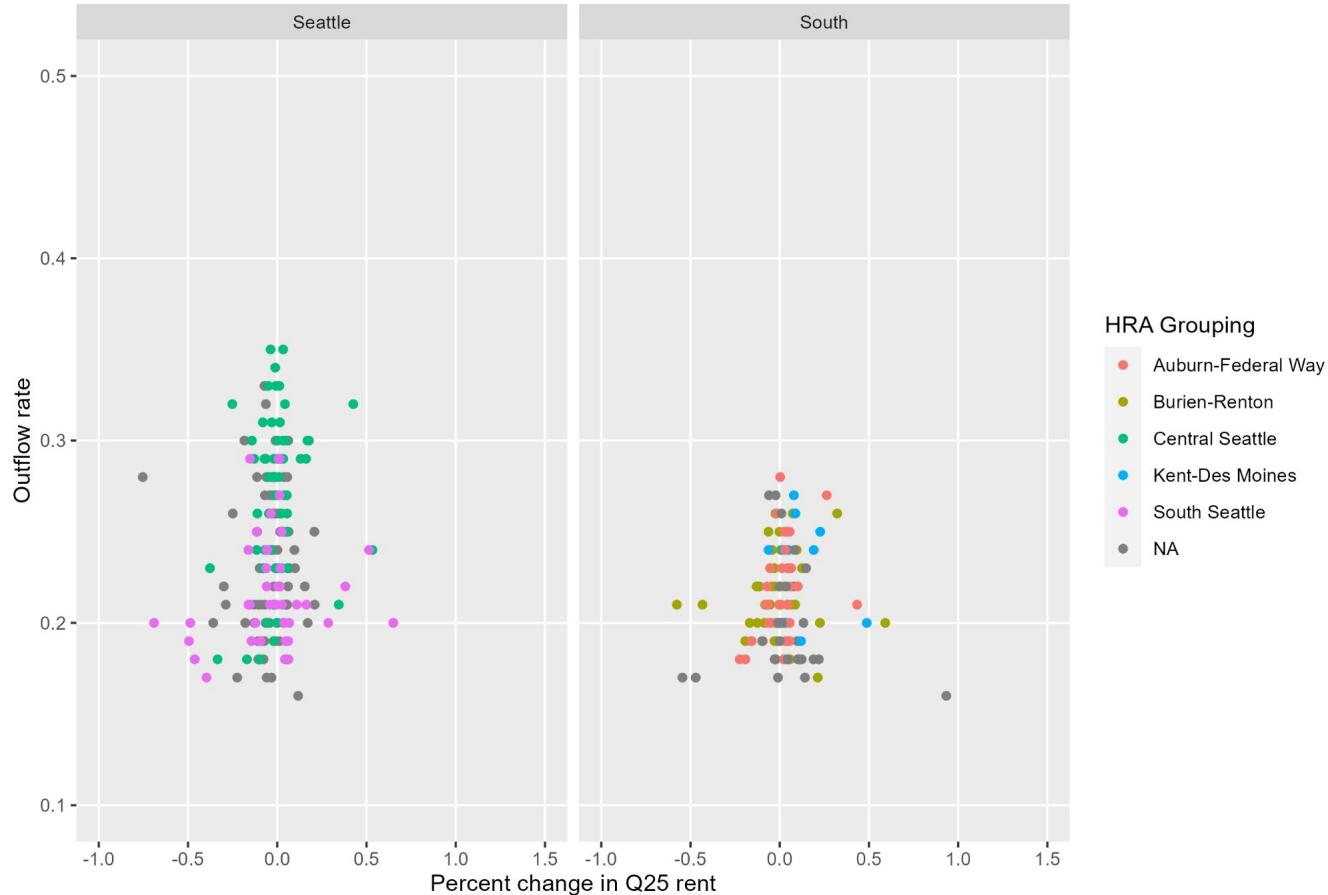


HRAs with the largest net-migration rate: 2021

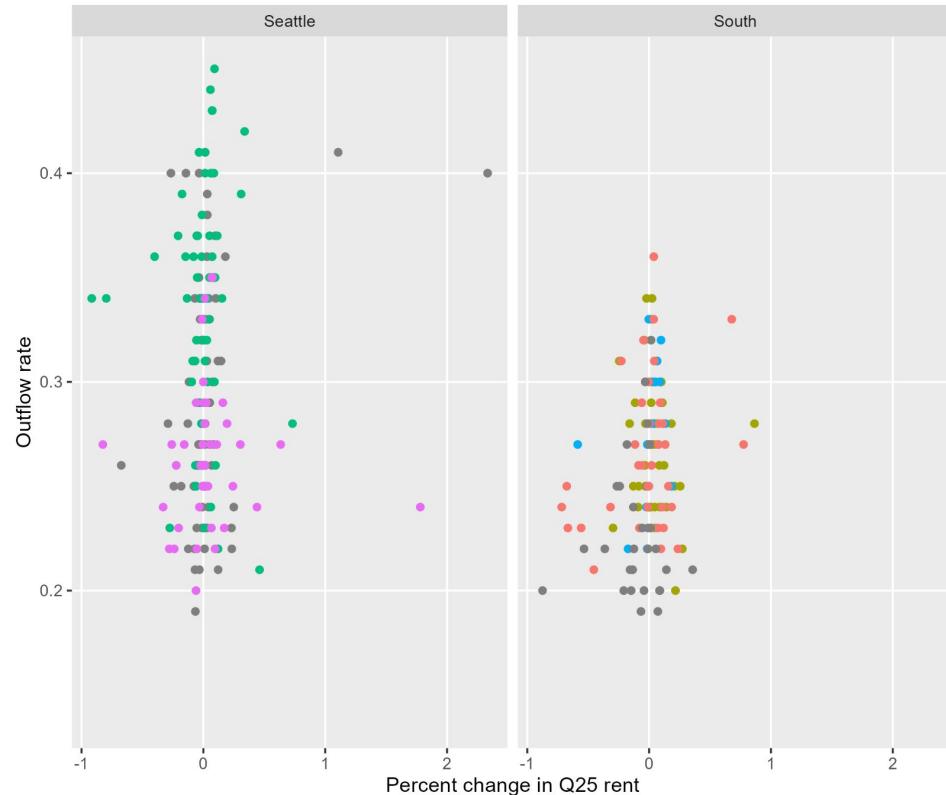




2017



2018

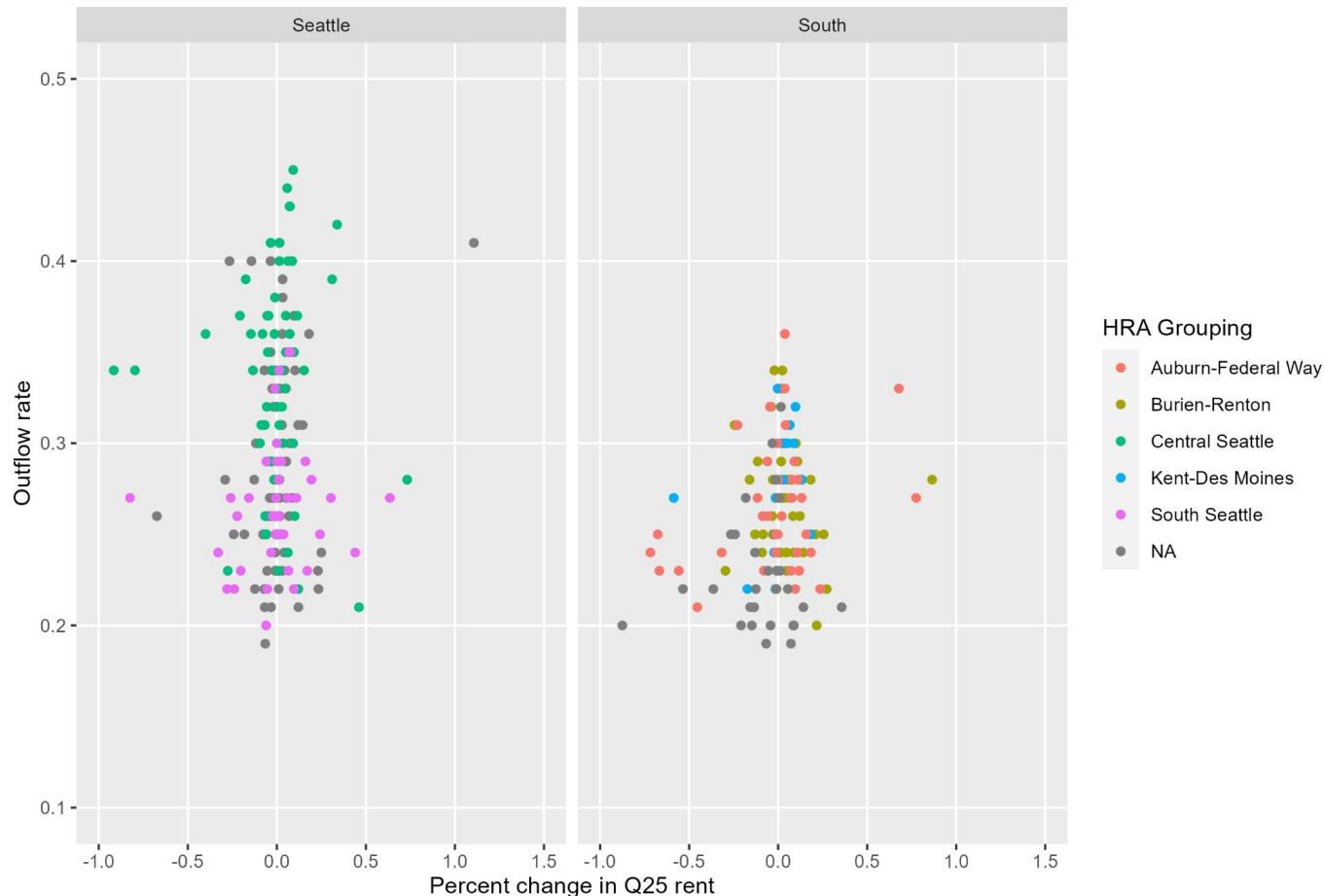


HRA Grouping

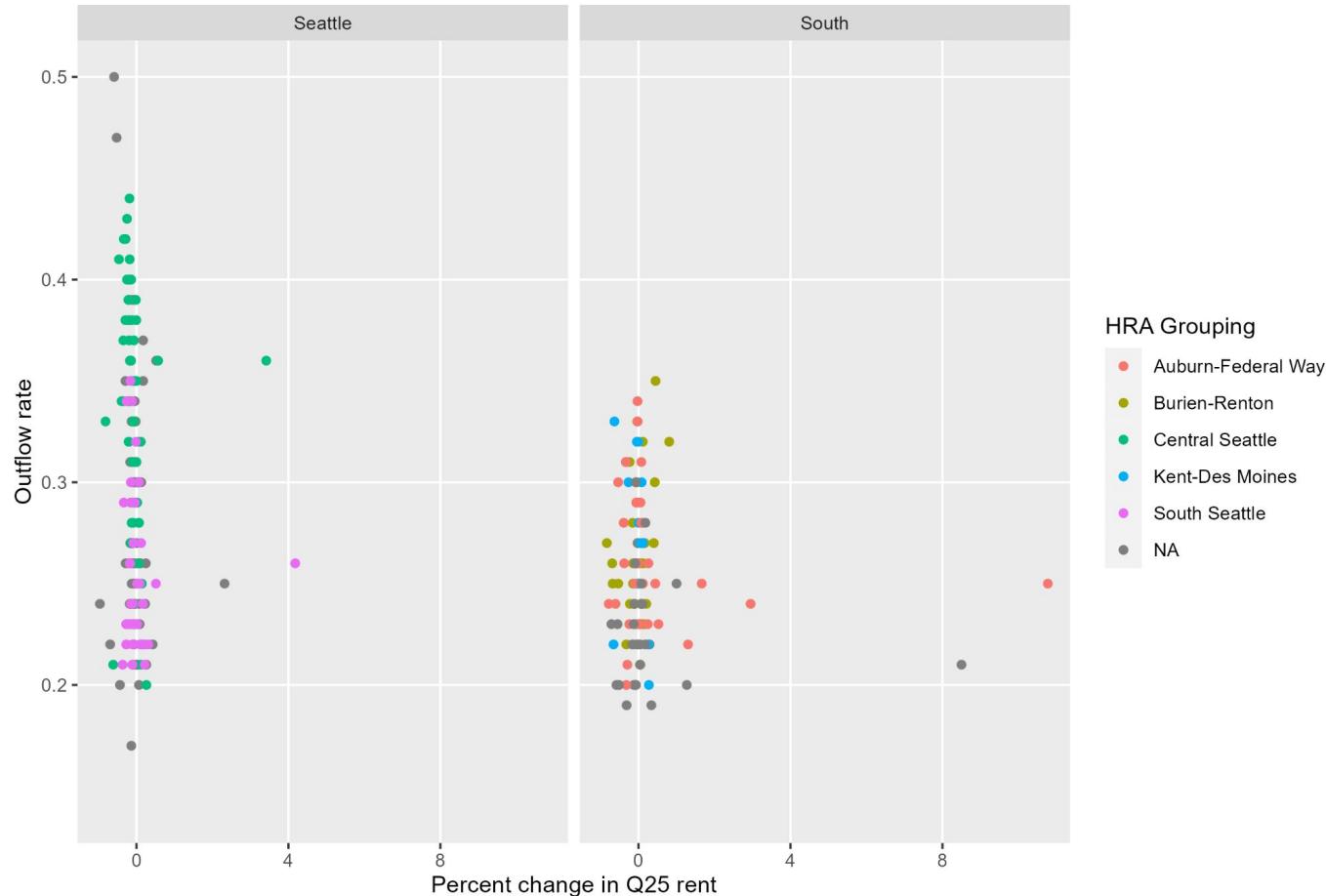
- Auburn-Federal Way
- Burien-Renton
- Central Seattle
- Kent-Des Moines
- South Seattle
- NA



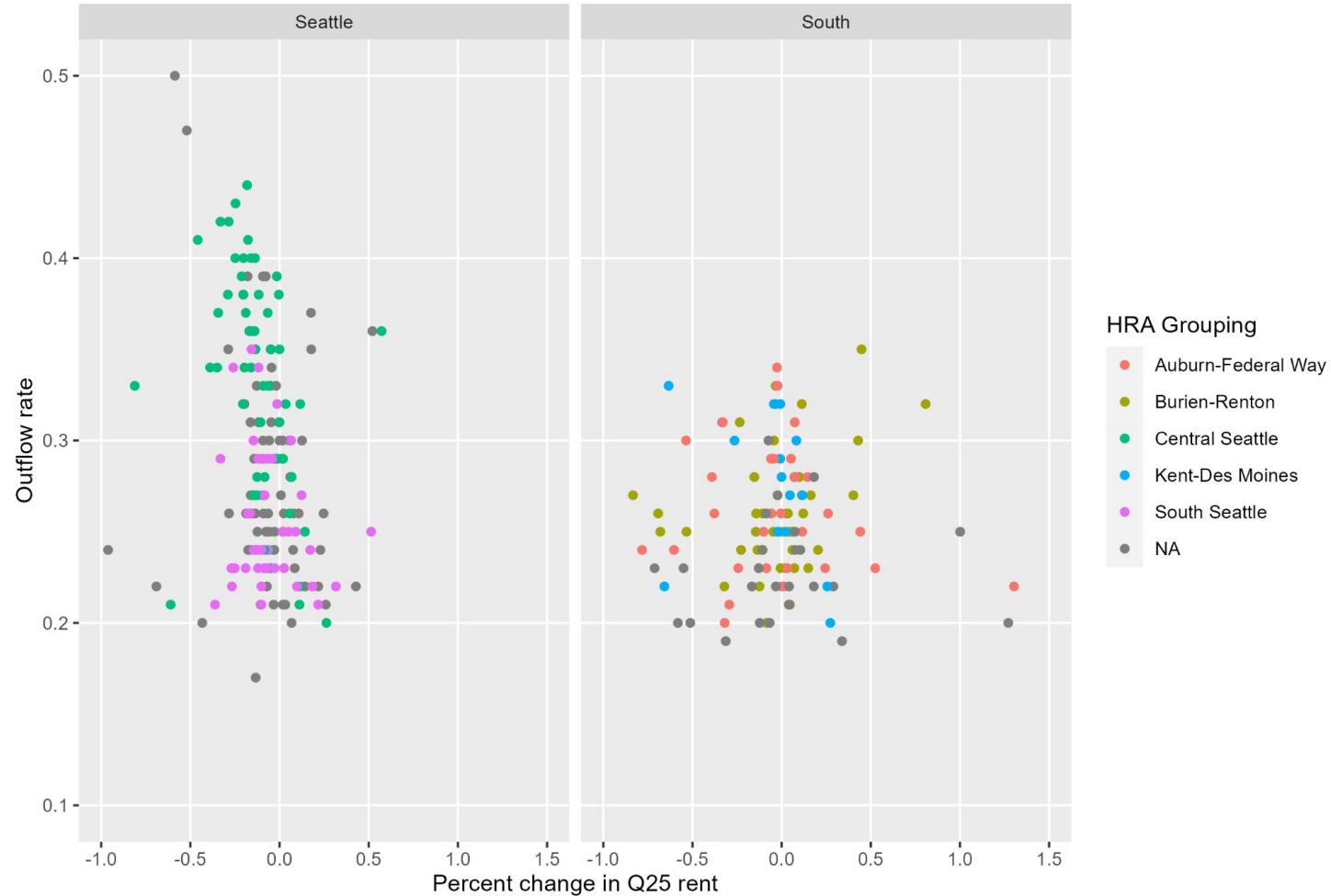
2018

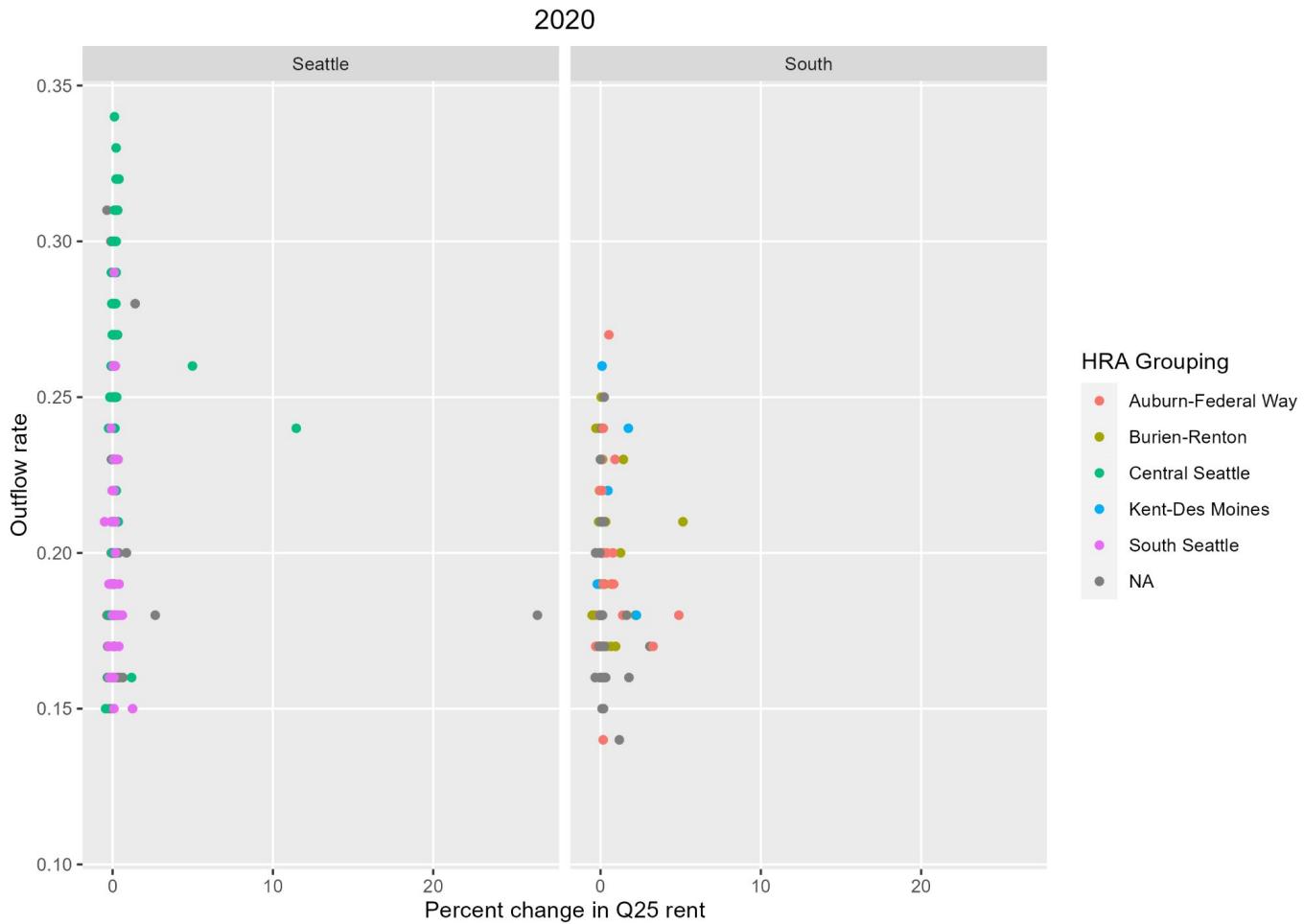


2019

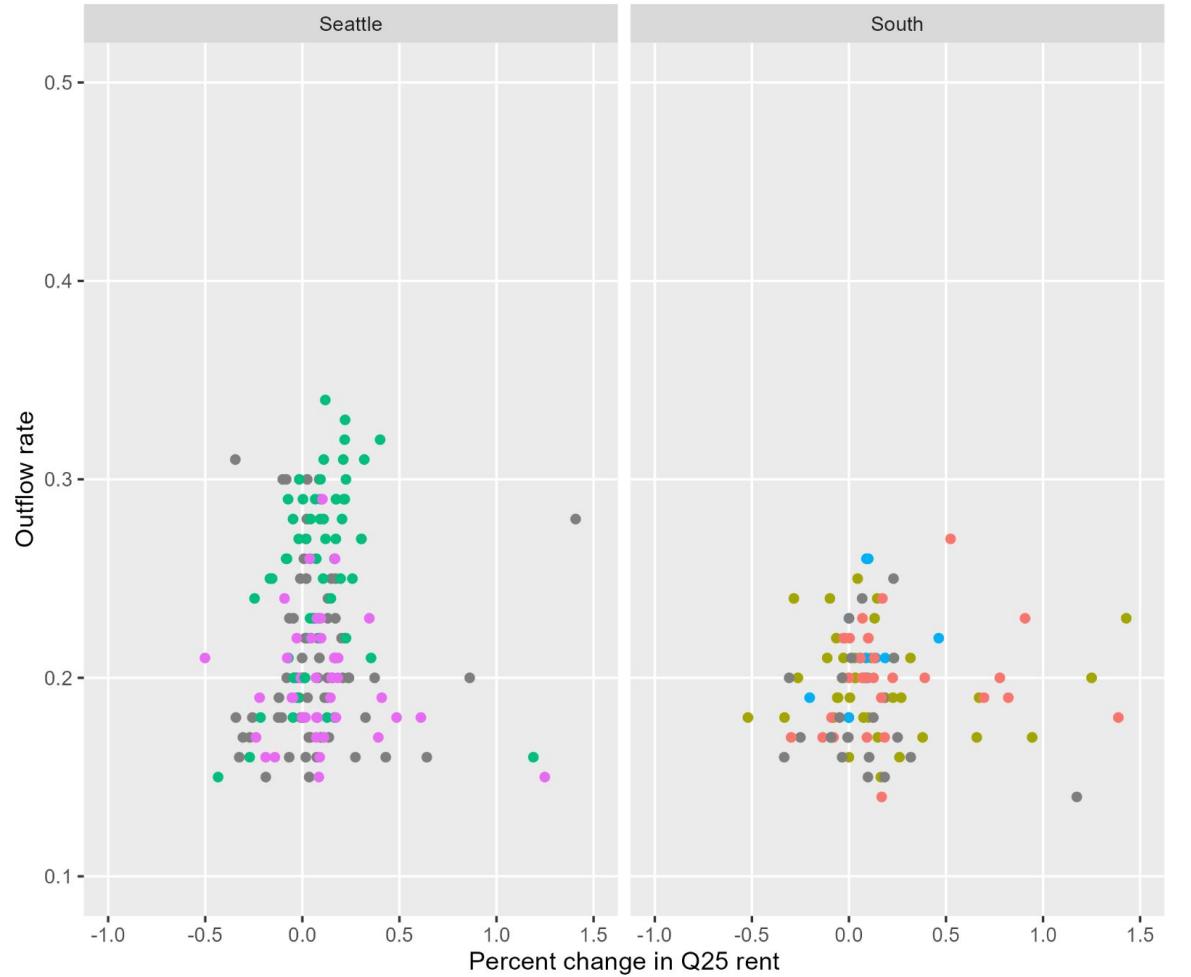


2019





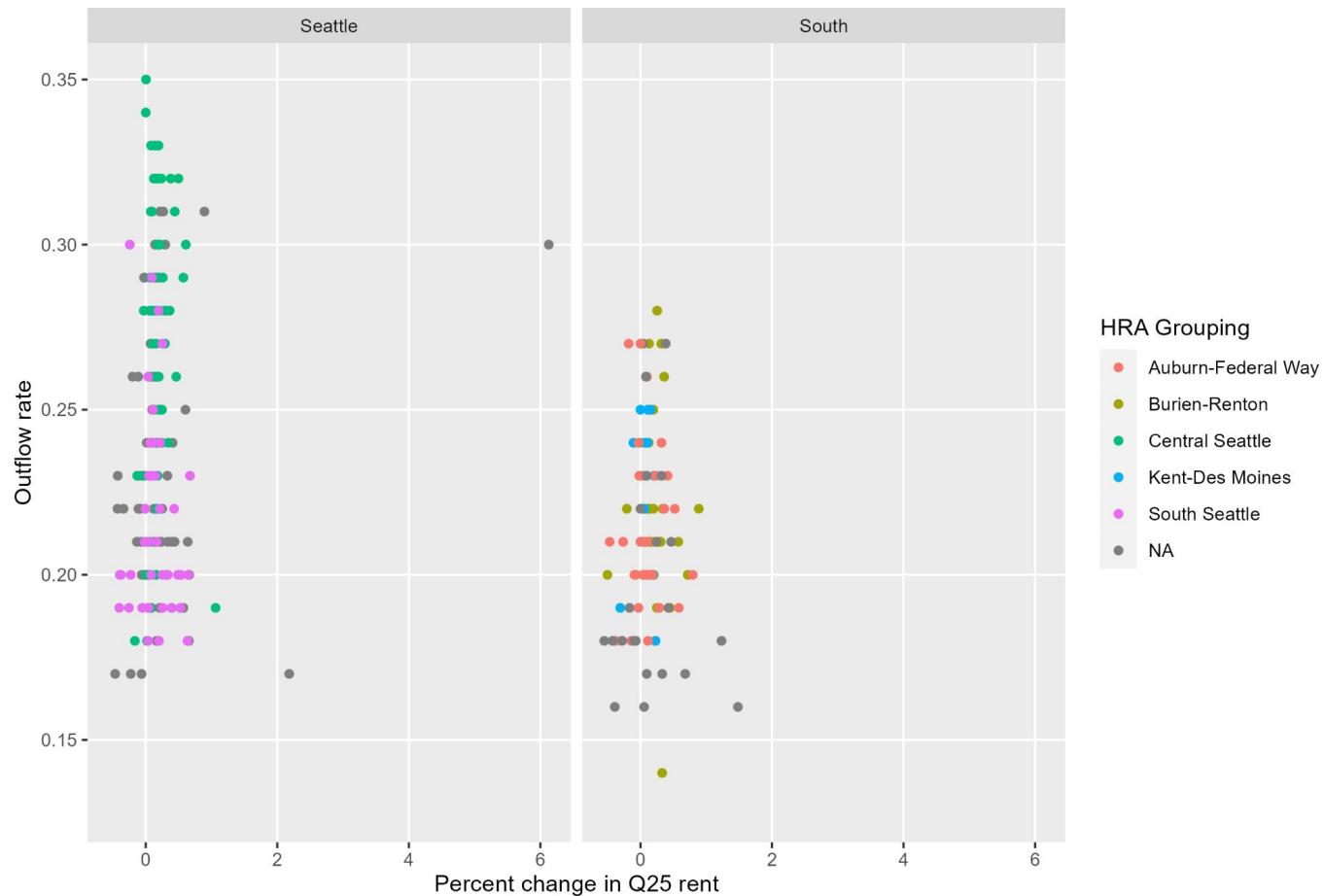
2020

**HRA Grouping**

- Auburn-Federal Way
- Burien-Renton
- Central Seattle
- Kent-Des Moines
- South Seattle
- NA



2021



2021

