



# Northern Virginia Transit Trends

June 2024



## Executive Summary

This report analyzes transit travel trends over time and space.

Analysis first focuses on the last 15 years of transit trends in Northern Virginia to better understand changes and consistencies in transit use. This study found that from 2008 to 2022:

- The use of public transit in Northern Virginia remained relatively consistent before the pandemic.
- Post-pandemic ridership recovery changes depending on mode and jurisdiction.
- The overall quantity of public transit service increased over time.
- Bus speeds decreased but commuter bus speeds increased with the opening of high-occupancy toll (HOT) lanes.

The report then analyzes travel trends geographically to understand movement across the region. This analysis found:

- Public transit is used most often for commutes and for connecting into Washington, D.C.
- More than 80% of all trips starting or ending in Virginia were not related to commuting.

This report identifies three key takeaway points to help regional leaders and planners with future decision-making:

- 1** Transit has been disproportionately used for commuting, however most trips in Northern Virginia are not work related. Transit agencies should investigate options to better meet non-commute travel.
- 2** The region's buses have slowed down. Northern Virginia should invest in opportunities to speed them up with dedicated bus lanes, queue jumps and transit signal priority.
- 3** Many transit riders use routes that take them outside of Northern Virginia to the District of Columbia and Maryland. Local transit agencies should prioritize options that can help move more people inside Northern Virginia.



## Table of Contents

Executive Summary.....	ii
Table of Contents.....	iii
List of Figures.....	iii
List of Tables.....	iv
Acknowledgements.....	iv
1. Introduction & Background.....	1
2. Data & Methodology .....	2
3. Results & Discussion .....	4
3.1 Ridership Trends Over Time .....	4
3.1.1. Ridership.....	4
3.1.2 Commuting .....	10
3.2 Service Trends Over Time .....	14
3.2.1 Average Trip Length .....	14
3.2.2 Revenue Hours.....	16
3.2.3 Bus Speeds.....	19
3.3 Transit Trends: A Snapshot of Regional Movement.....	20
3.3.1 Trip Mode .....	20
3.3.2 Trip Purpose.....	23
4. Conclusions .....	24
Key Takeaways .....	25
Appendix .....	26

## List of Figures

FIGURE 1: Northern Virginia and the Greater Washington region.....	2
FIGURE 2: Change in national and local transit ridership trends by mode since FY 2008.....	5
FIGURE 3: Northern Virginia ridership by transit agency .....	7
FIGURE 4: Transit ridership by Northern Virginia transit agencies and mode, excluding Metro services.....	8
FIGURE 5: Change in ridership productivity since FY 2008 by transit agency .....	9
FIGURE 6: Northern Virginia commute modes.....	10
FIGURE 7: Share of public transit commuters, Northern Virginia vs. US.....	11
FIGURE 8: Commute mode by jurisdiction .....	13
FIGURE 9: Average trip length by mode.....	15
FIGURE 10: Average local bus trip length by agency.....	16



FIGURE 11: Percent change in vehicle revenue hours (VRH) since FY 2008 ..... 17

FIGURE 12: Bus speeds by agency and mode ..... 19

FIGURE 13: (a) Share of trips beginning or ending in Virginia, DC and Maryland and (b) breakdown of trip mode for trips beginning or ending in Virginia ..... 21

FIGURE 14: Public Transit trips beginning or ending in Virginia ..... 22

FIGURE 15: Trip purpose for trips beginning or ending in Virginia ..... 23

FIGURE 16: Purpose and mode of trips beginning or ending in Virginia ..... 24

**List of Tables**

Table 1: Simplified commute modes..... 26

Table 2: Simplified modes from the RTS trip mode matrix ..... 27

Table 3 : Trip purpose and examples of activity origin-destination pairs..... 28

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# 1. Introduction & Background

Northern Virginia is a complex and ever-changing region. Population, industry, land-use, and even the definition of the Northern Virginia region has changed and shifted over time. How people move is a crucial part of any space, no matter size or density. Understanding where and how travel has changed – and where and how it hasn’t changed – can provide useful insight for regional planners and leaders. Travel in Northern Virginia cannot be discussed without highlighting the role of public transit. Northern Virginia is served by Metrorail, the Virginia Railway Express (VRE) and seven bus agencies. As one of the most congested regions in the nation<sup>1</sup>, transit is often relied on to move around the region while avoiding bumper-to-bumper traffic.

As displayed in **Figure 1**, this report defines Northern Virginia as the Arlington, Fairfax, Loudoun and Prince William counties and the cities of Alexandria, Falls Church, Fairfax, Manassas and Manassas Park. This study also considers movement throughout the entire Greater Washington region, defined by the Washington Metropolitan Area Transit Authority (Metro) Compact Area<sup>2</sup> plus the jurisdictions within the OmniRide service area. The Northern Virginia region is served by eight transit agencies that provide four different modes of transportation: local bus (ART, DASH, CUE, Fairfax Connector, Metrobus, Loudoun County Transit and OmniRide<sup>3</sup>), commuter bus (Loudoun County Transit and OmniRide), heavy rail (Metrorail) and commuter rail (VRE). In this report, Metro is always divided into Metrobus and Metrorail because of the difference in modes.

Over the last 15 years, the population of Northern Virginia has grown by 21%, from 2 million residents in 2008 to 2.4 million residents in 2022<sup>4</sup>. During this time, the region has added eleven new Metrorail stations with the opening of the new Metrorail Silver Line, added a new VRE station in Spotsylvania, and increased bus revenue miles by 9%. The addition of high-occupancy toll (HOT) lanes has also enabled more efficient movement of transit in the region.

Due to data availability constraints, the most recent year available for all analyses was 2022. However, the state of transit at the end of calendar year 2022 was still amid recovery from the impacts of the COVID-19 pandemic. Between December 2020 and December 2023, Northern Virginia transit ridership increased by 180%, meaning ridership for bus, Metrorail, and VRE has nearly tripled since the beginnings of the pandemic. Even in the last year (2022 to 2023), total Northern Virginia transit ridership has increased 24%. Northern Virginia Metrorail ridership between 2022 and 2023 alone increased 31%<sup>5</sup>. Northern Virginia transit ridership continues to grow each day in the region.

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<sup>1</sup> <https://inrix.com/scorecard/>

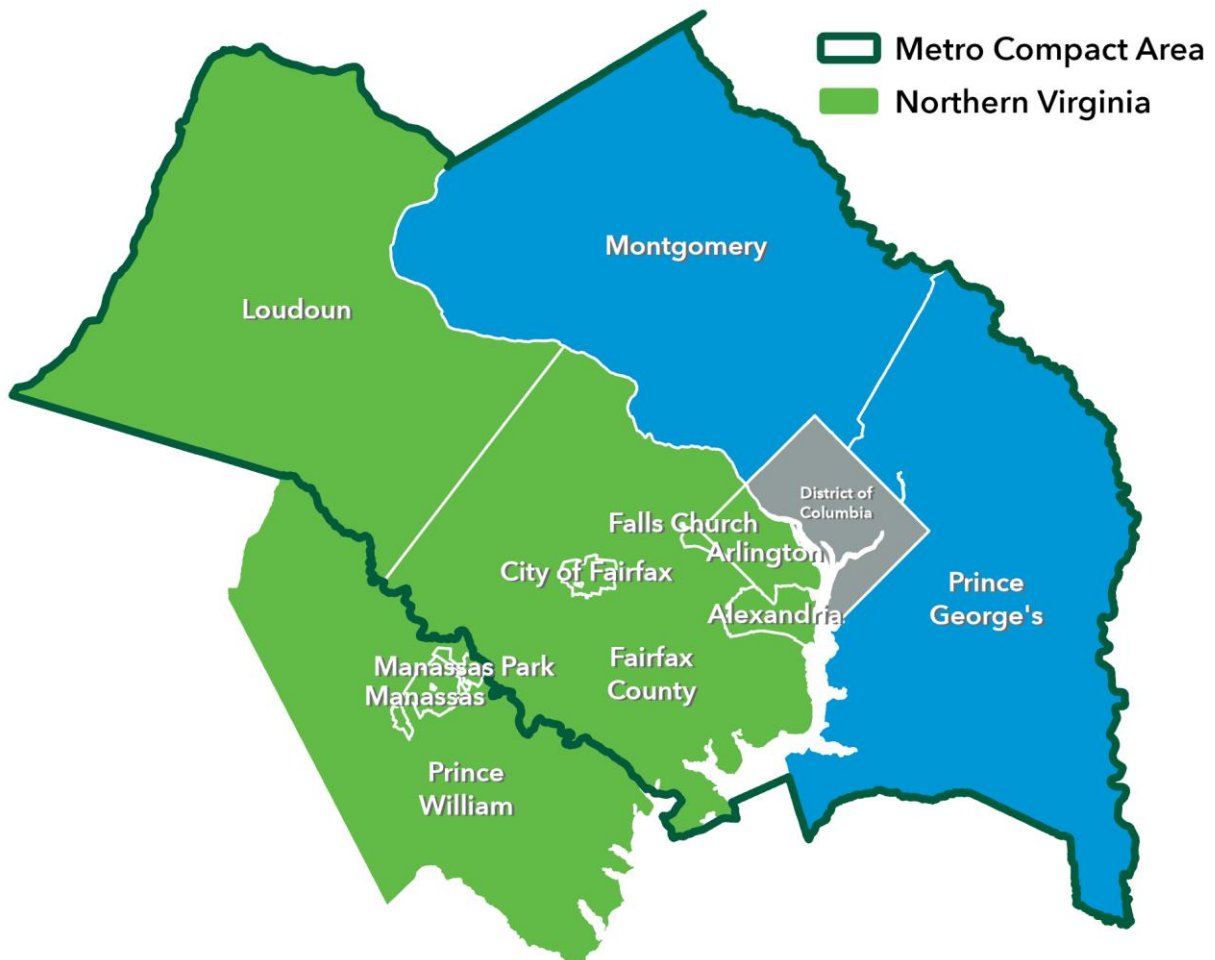
<sup>2</sup> <https://law.lis.virginia.gov/compacts/washington-metropolitan-area-transit-authority-compact-of-1966/>

<sup>3</sup> OmniRide and Loudoun County Transit provide both commuter and local service.

<sup>4</sup> 2022 and 2008 American Community Survey 1-Year estimates.

<sup>5</sup> Based on December 2020 and December 2023 ridership data for Northern Virginia bus, commuter rail and heavy rail.

This report enhances our understanding of Northern Virginia transit trends from two perspectives. First by tracking transit use over a 15-year period. This provides insight into what aspects of transit have been consistent and what aspects have changed over the last decade and a half. Second, the report analyzes travel trends spatially to better understand movement across the region, with a focus on mode of transportation and trip purposes.



Source: American Community Survey

**FIGURE 1:** Northern Virginia and the Greater Washington region

## 2. Data & Methodology

Three primary sources of data are used in this report. The following section details data sources and limitations as well as data processing and calculations.

The U.S. Census Bureau American Community Survey (ACS) 1-Year estimates include data on commuting mode, which were used as a measurement of travel patterns over time. A 15-year

period (2008 to 2022) was chosen based on availability of data. The 1-Year estimates have smaller sample sizes and only cover population areas of more than 65,000. Therefore, this study excludes the cities of Fairfax, Falls Church, Manassas and Manassas Park in some analyses. However, the increased frequency and currency of the data is more useful to this study than the granularity provided by other census products. There were two notable gaps in the study period. First, no data was available in 2011 for Loudoun County and City of Alexandria. Second, the Census Bureau did not publish 2020 ACS 1-Year estimates due to the impacts of COVID-19 pandemic<sup>6</sup>, therefore 2020 was omitted from this portion of the analysis.

Data from the Federal Transit Administration (FTA) National Transit Database (NTD)<sup>7</sup> was used to evaluate ridership and service changes over time. This study used revenue hours, revenue miles, passenger miles traveled (PMT) and ridership data for the fiscal year<sup>8</sup> (FY) 2008 to 2022 period. Revenue miles and hours is defined as the time, measured in miles or hours, respectively, when a vehicle is available to the general public and there is an expectation of carrying passengers<sup>9</sup>. FTA NTD data was used to calculate other service measures including average passenger trip length and average vehicle speed. To calculate average trip length, PMT was divided by ridership for each agency. Revenue miles were divided by revenue hours to determine an average bus speed for an agency. See the **Appendix** for more information on the metric calculations.

The Metropolitan Washington Council of Governments and the Transportation Planning Board (MWCOG/TPB) conduct a decennial Regional Travel Survey (RTS) to understand the daily travel patterns of the region's residents. It includes a one-day travel diary for a sample of residents from the Greater Washington Region. The survey, last conducted in 2017, provides a snapshot of movement across the region on an average weekday<sup>10</sup> in the region. Data on trip origin, trip destination, mode of transportation, and trip purpose were analyzed to understand how public transit is used in Northern Virginia over one day. RTS trip mode was simplified to align with the ACS public transit groupings: bus, heavy rail and commuter rail (the simplification process is explained in more detail in the **Appendix**).

The different types of data have different strengths and limitations. ACS data considers multiple time periods, but only considers commute data and is only available at the jurisdiction level. On the other hand, RTS data only provides a weekday snapshot from 2017. However, RTS has much more geographic granularity and much richer information as to how transit is used

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<sup>6</sup> <https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2020/1-Year.html>

<sup>7</sup> <https://www.transit.dot.gov/ntd>

<sup>8</sup> NTD annual data is reported in an agency's fiscal year; all fiscal years in this report run from July to June. National Transit Database. (2020). Annual Reporting User Guide. Federal Transit Administration. Retrieved from <https://www.transit.dot.gov/sites/fta.dot.gov/files/2020-09/2020%20NTD%20Annual%20Reporting%20User%20Guide.pdf>

<sup>9</sup> <https://www.transit.dot.gov/ntd/national-transit-database-ntd-glossary#R>

<sup>10</sup> Because the survey is for a weekday, the analysis does not include any discussion of weekday versus weekend travel trends, although it is acknowledged that there are notable differences between the two.

beyond commuting. Together, these data provide a more complete picture of regional transit trends.

## 3. Results & Discussion

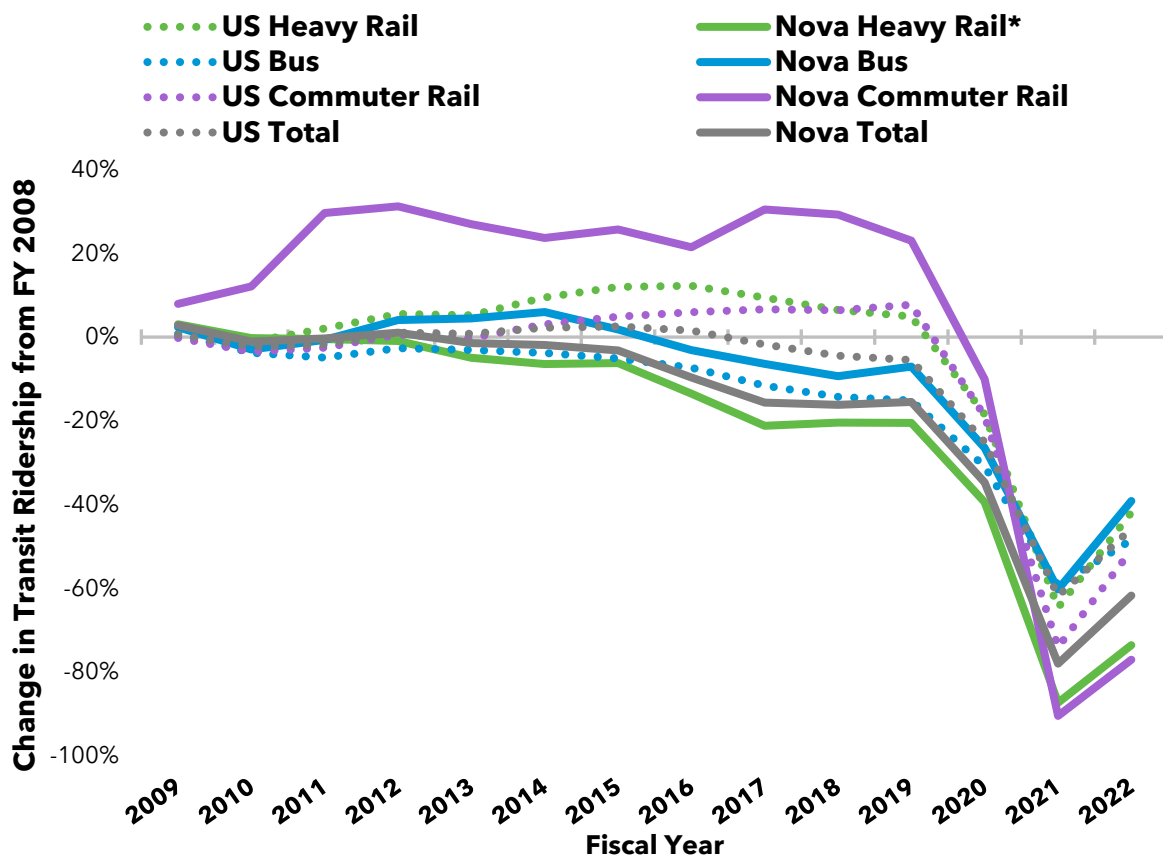
### 3.1 Ridership Trends Over Time

This section evaluates trends in transit ridership overall, then dives deeper into commuting trends over the 15-year period of 2008 to 2022. Trends were first analyzed at the regional level to understand overarching patterns. The analysis then looked more closely at individual jurisdictions to identify local trends over time.

#### 3.1.1. Ridership

Transit ridership has shifted markedly in the last 15 years in Northern Virginia and in the country overall. **Figure 2** compares the national and Northern Virginia transit ridership trends by mode for the study period. Even before the pandemic caused a major decrease in ridership, US transit ridership had decreased 5% between 2008 and 2019. By 2022, national transit ridership was 46% lower than 2008.





Source: APTA Ridership Reports, National Transit Database  
 \*Heavy Rail includes the entire Metrorail system spanning DC, MD, and VA.

**FIGURE 2:** Change in national and local transit ridership trends by mode since FY 2008

**Figure 2** shows that depending on the mode, Northern Virginia transit trends exceeded national trends. In the case of commuter rail, VRE ridership in the late 2000s in Northern Virginia was growing, while nationally commuter rail ridership was decreasing. Northern Virginia bus ridership also shows a stronger trend than the national average. Bus ridership had been decreasing nationally years before Northern Virginia bus ridership started following a similar trend. Beginning in FY 2016, Northern Virginia bus ridership began to decrease from FY 2008 levels. The rate of that decrease was comparatively less, meaning that Northern Virginia bus ridership was decreasing slower than the national trend. Furthermore, Northern Virginia bus ridership recovered faster after the initial impact of the pandemic. Local heavy rail (Metrorail) and commuter rail (VRE) did not recover as quickly as the national average, possibly because

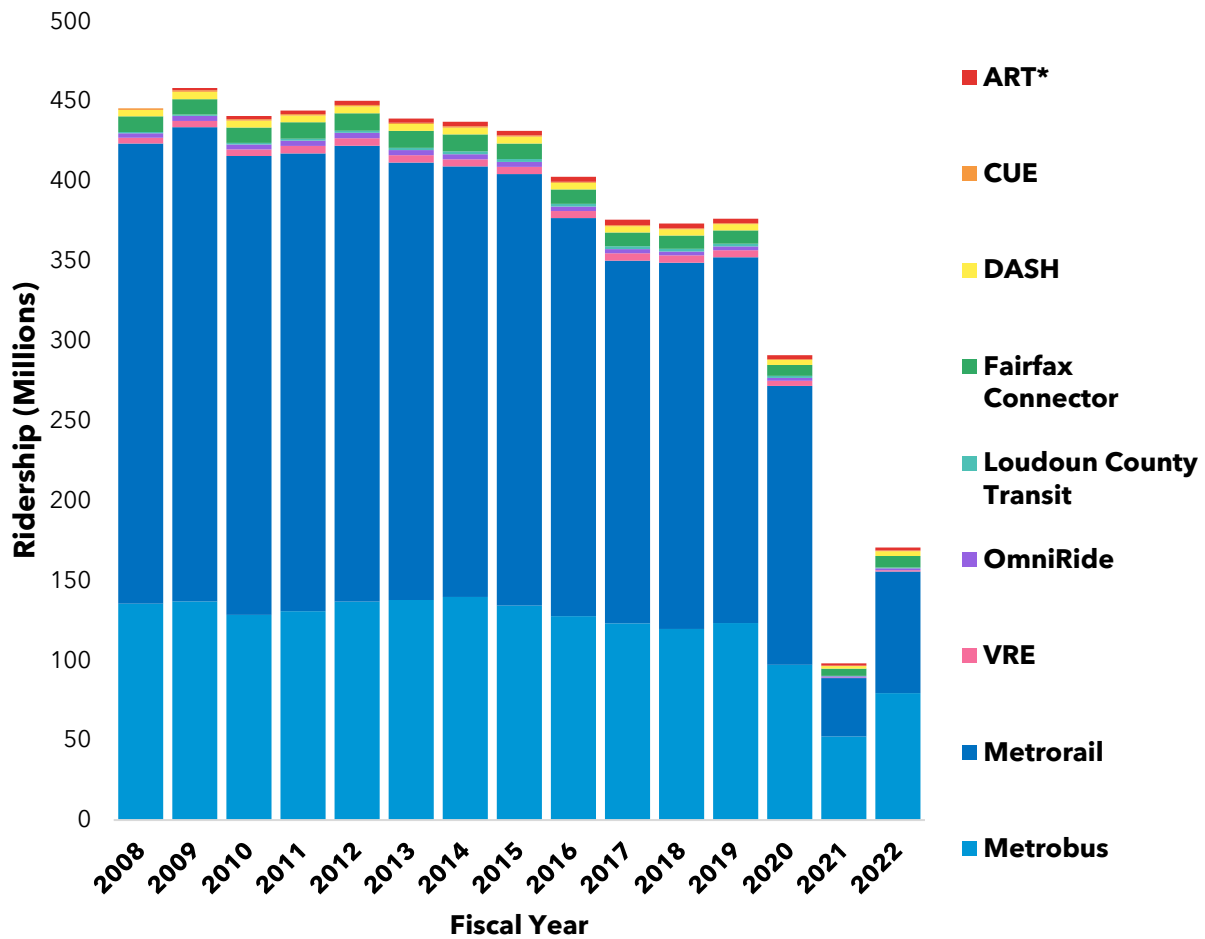
of the high share of riders in the federal workforce<sup>11</sup> and service cuts related to the 2021 Blue Line derailment<sup>12</sup>.

Within the Northern Virginia region, there is variation in ridership trends over the study period. The transit agencies included in this report serve different sized populations, service areas, and types of passengers. This results in large disparities in the volume of riders. **Figure 3** plots ridership for all eight transit agencies over the study period. Metrorail and Metrobus have a substantially higher share of riders each year. Metro's service area includes Maryland, Virginia, and the district, so much higher ridership on Metrobus and Metrorail is expected. Since the share of ridership by all the other transit agencies is such a small share, **Figure 4** excludes Metrobus and Metrorail to explore the ridership time series for the local Northern Virginia systems. Of the local Northern Virginia transit agencies, Fairfax Connector has the next highest ridership numbers.

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<sup>11</sup> <https://www.washingtonpost.com/transportation/2021/09/25/metro-pandemic-federal-worker-commuters/>

<sup>12</sup> <https://wjla.com/news/local/metro-derailment-blue-line-train-one-year-anniversary-october-12-2021-arlington-cemetery-virginia-washington-dc-7000-series-railcars-wheel-alignment-issues-metrorail-safety-commission-randy-clarke-looking-back-wmsc-wmata>



\*ART FY 2008 data not available  
 Source: National Transit Database

**FIGURE 3:** Northern Virginia ridership by transit agency

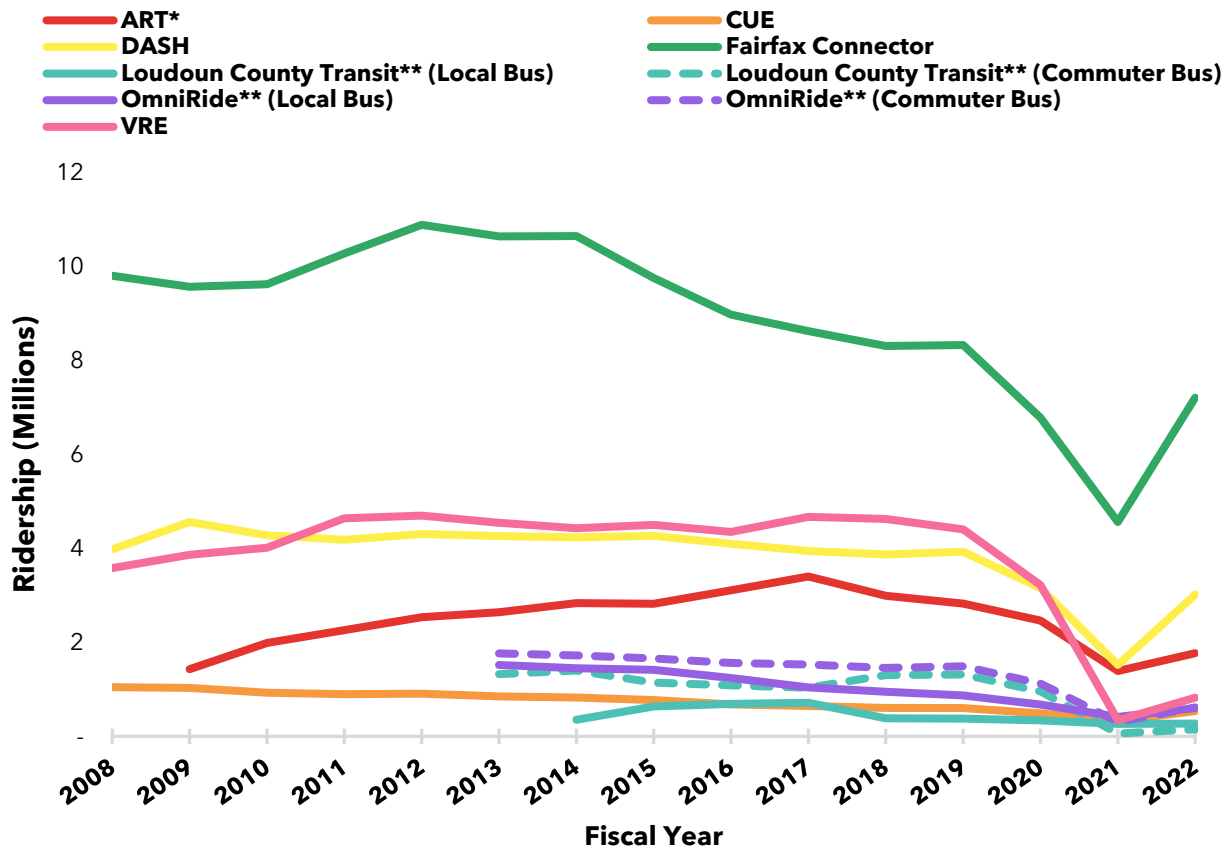
There is a clear split in trends between the pre- and post-pandemic period (FY 2008 – FY 2019, FY 2020 – FY 2022). In the time before the pandemic, ART, Loudoun County Transit local bus, and VRE all increased ridership compared to FY 2008. All three agencies built up service during this period (see **Section 3.2.2** Revenue Hours), which may attribute to the bump in ridership.

The commuter bus routes of OmniRide and Loudoun County Transit, as well as VRE, have had the largest decrease in ridership since the start of the pandemic in FY 2020. Previous NVTCT reports have also cited the slower recovery of commuter services<sup>13</sup>, which can be linked to the slow return of full in-office work, particularly by the federal government. ART, CUE and DASH had the smallest drop in ridership between FY 2019 and FY 2022. While all the transit agencies saw different trends before and during the pandemic, every single agency increased ridership

<sup>13</sup> <https://novatransit.org/uploads/studiesarchive/2022NoVaCOVIDTransitReport.pdf>

between FY 2021 and FY 2022. The largest uptick in ridership during this “post-pandemic” period was Loudoun County Transit commuter bus routes, which increased ridership by 149%.

It is important to note that ridership data in this report does not include FY 2023 data as it was not available at the time of analysis. Since the end of FY 2022 (June 30, 2022), ridership has continued to increase. DASH, for example, hit the milestone of 4.5 million riders in FY 2023<sup>14</sup>, the highest number of annual riders the agency has seen since its inception in FY 1985.



\*ART FY 2008 data not available

\*\*Before 2013, Loudoun County Transit and OmniRide reported local bus and commuter bus together

Source: National Transit Database

**FIGURE 4:** Transit ridership by Northern Virginia transit agencies and mode, excluding Metro services

A productivity measure can help contextualize transit ridership trends. **Figure 5** shows the change in ridership productivity since FY 2008 for each transit agency, where productivity is the average number of people who board a transit vehicle per hour it operates. While ridership increased for ART, Loudoun County Transit local bus and VRE, there was still a decrease in

<sup>14</sup> <https://www.dashbus.com/ridership-23-celebration>

ridership productivity for these agencies. In fact, there was a decrease in productivity for the entire region.

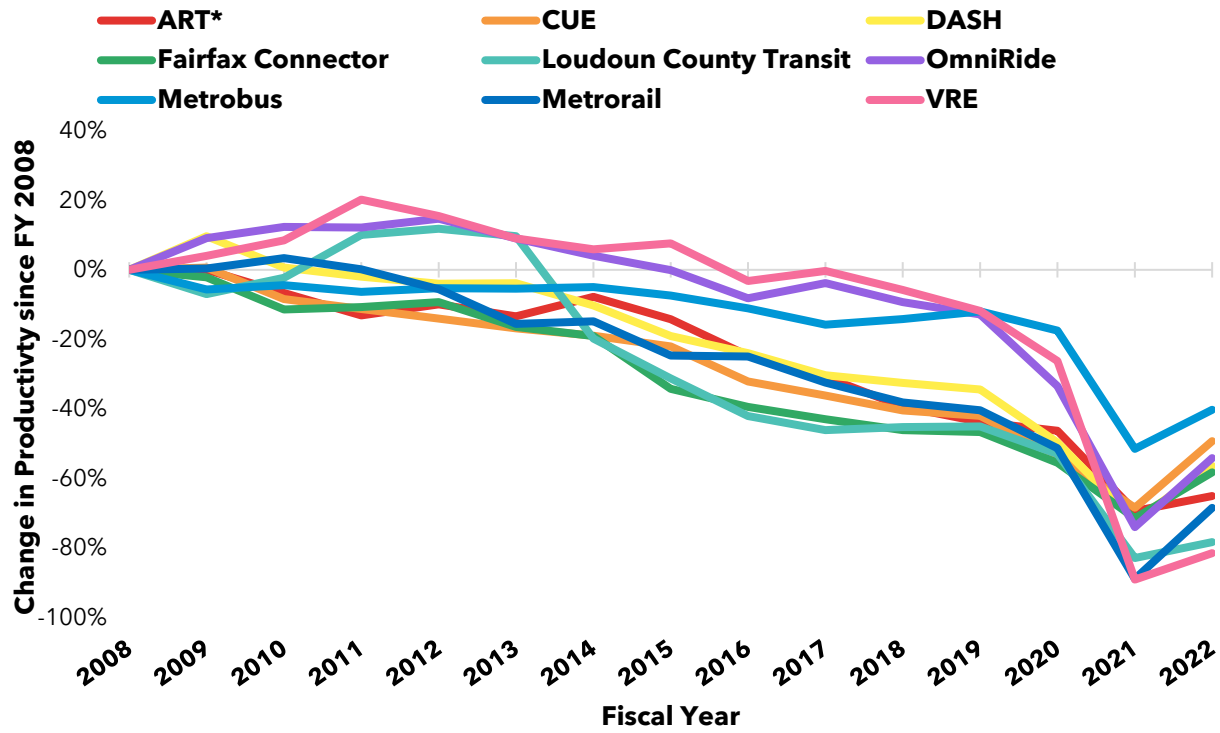
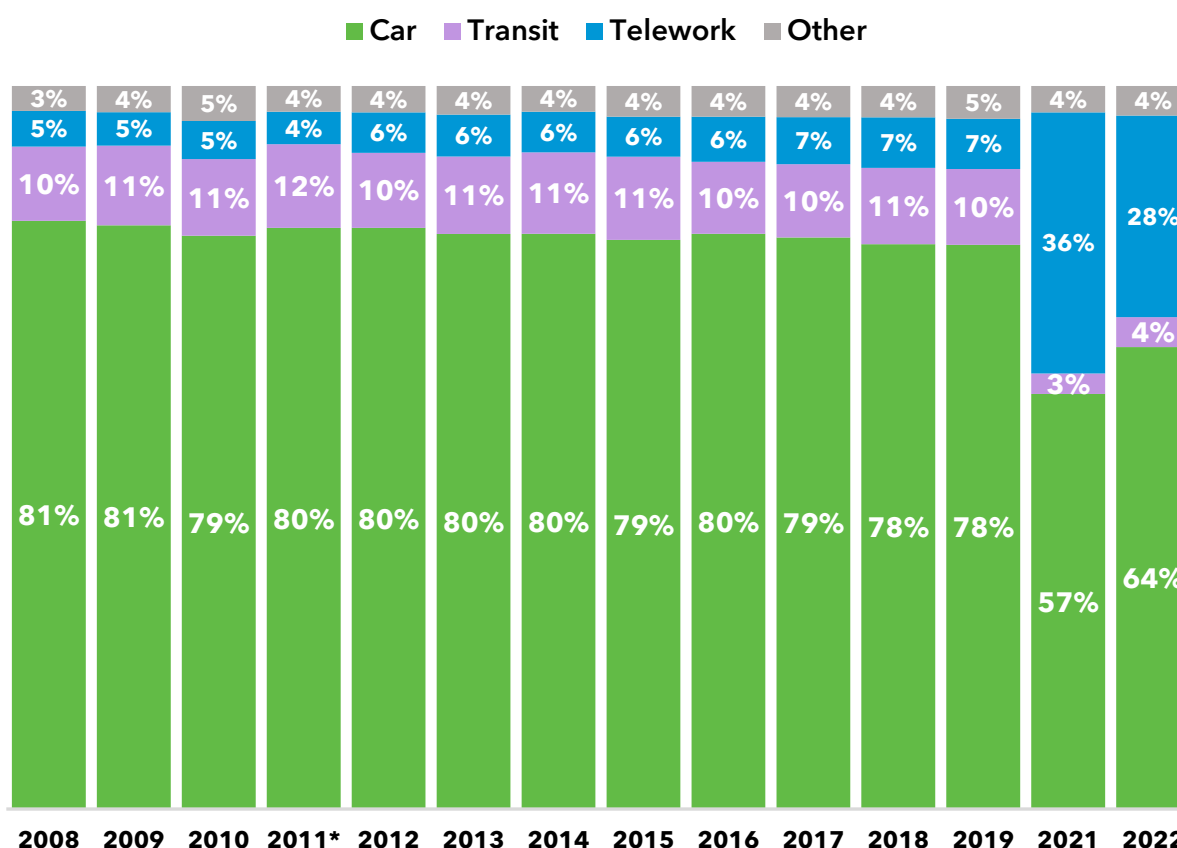


FIGURE 5: Change in ridership productivity since FY 2008 by transit agency

### 3.1.2 Commuting

Commuting is often used as a stand-in for understanding travel patterns in a region. While not completely representative of transportation mode use, tracking modes for commuting can provide valuable insight into peak transit demands.

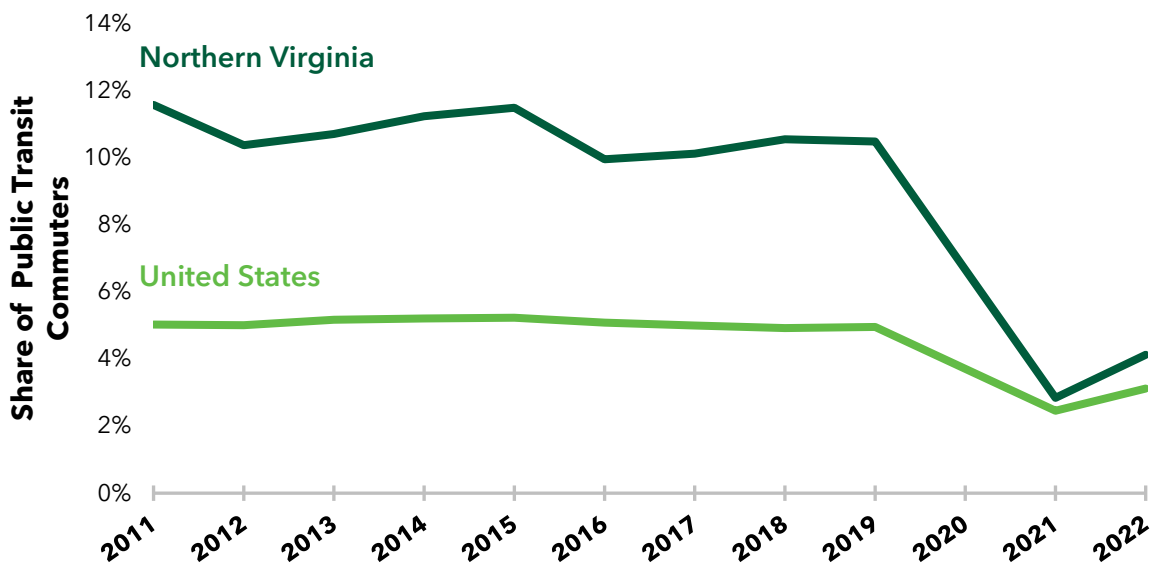
One of the most prominent patterns in the commute time-series is the shift to working from home beginning in 2020 as the COVID-19 pandemic began. Much of the data trends can be described in terms of “pre” and “post” pandemic. **Figure 6** shows the share of commuting broken down by mode for the study period. There was little change in commuting modes between 2008 and 2019. During this period, public transit was consistently 10-11% of all commutes. The stability of public transit use emphasizes the vital role it plays in regional commutes. The share of public transit commuting dropped to 2.8% in 2021 and then increased to 4.1% of all commutes in 2022. The pandemic simultaneously had a significant impact on telework. Between 2019 and 2021, the share of telework increased from 7% to 36%.



\*2011 data for Loudoun County and City of Alexandria not available  
 Source: American Community Survey 1-Year Estimates

**FIGURE 6:** Northern Virginia commute modes

**Figure 7** compares the share of public transit commuters in Northern Virginia to the average share of public transit commuters in the US. Over the full study period, the share of Northern Virginians who used public transit to commute was higher than the national average. Then at the beginning of the pandemic, the share of public transit commuters dropped more substantially in the Northern Virginia region than the nation as a whole. This major decline in Northern Virginia public transit commuters can partially be attributed to the large federal workforce in the area, many of whom commuted via transit, especially Metrorail, into Washington, DC before the pandemic. The share of public transit commuters in Northern Virginia also increased faster after the pandemic than the national average. There are several factors that could have affected this subsequent rebound in regional transit use. Congestion in the Greater Washington region decreased between 2019 and 2020<sup>15</sup>, coinciding with the beginning of the COVID-19 pandemic and the decrease in people moving around the region, especially for work. Congestion again increased in the years following as restrictions were lifted and vaccines became available<sup>16</sup>. However, many people who returned to work in office only come in two or three days a week, and some have switched to commute via car rather than transit<sup>17</sup>. As congestion in the region moved toward pre-pandemic levels, it's likely some people returned to public transit to avoid the worsening traffic, although the return has been dampened some by the ripple effects of the change in where and how people work.



Source: American Community Survey 1-Year Estimates

**FIGURE 7:** Share of public transit commuters, Northern Virginia vs. US

<sup>15</sup> <https://inrix.com/press-releases/2019-traffic-scorecard-us/>, <https://inrix.com/scorecard-city-2022/?city=Washington%20DC&index=20>

<sup>16</sup> <https://www.defense.gov/Spotlights/Coronavirus-DOD-Response/Timeline/>

<sup>17</sup> <https://www.washingtonpost.com/transportation/2023/09/22/dc-commute-cars-traffic-metro/>

One of the many advantages to public transit use is the environmental benefits. Public transportation uses less energy and produces fewer greenhouse gases per passenger mile than single-occupancy vehicles<sup>18</sup>. Although the overall share of public transit commutes decreased after the pandemic, car commutes also decreased with telework significantly increasing in their place. In the short term, the increase in working from home led to a reduction in carbon emissions. However, the longer-term effects of teleworking on carbon emissions may be offset by vehicle and housing market adjustments. Marz & Sen<sup>19</sup> found that as teleworking increases, teleworkers invest less in vehicle fuel economy and are less willing to live near city centers. In the longer term, telecommuters may end up driving more with less fuel-efficient cars. The post-pandemic trend indicates that after the initial shift to telework in 2021, telework has been decreasing and both public transit and car commuting are increasing. *Source: American Community Survey 1-Year Estimates*

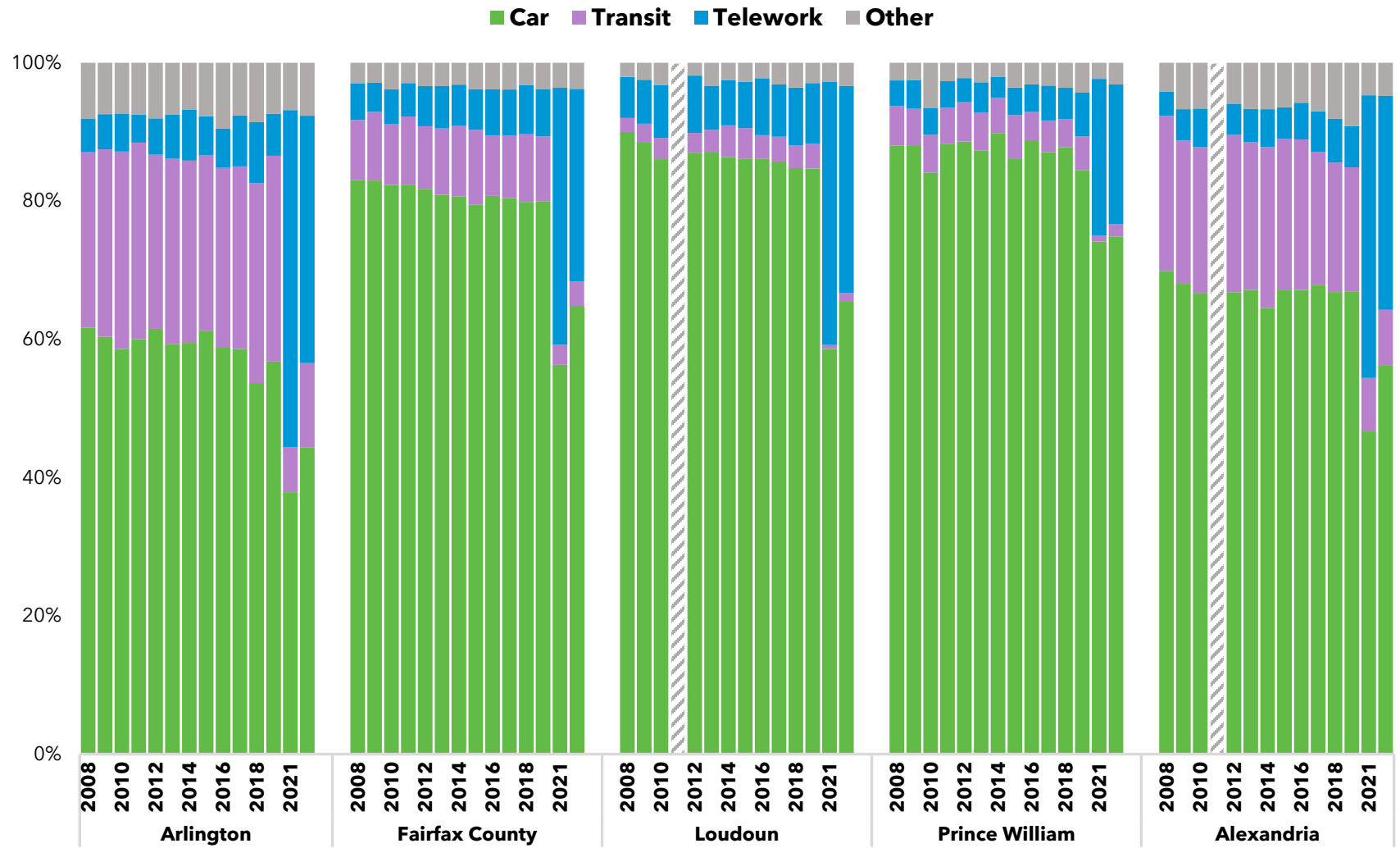
**Figure 8** provides a closer look into individual jurisdictional trends reflecting the variety of commuting patterns within Northern Virginia. In jurisdictions with Metrorail stations, public transit use is a higher share of commutes than elsewhere in the region. Arlington County has the highest share of public transit commuters, especially in the years directly leading to the pandemic. In 2019, 30% of commutes from Arlington residents were by public transit.

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<sup>18</sup> [https://www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/greenhouse\\_brochure.pdf](https://www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/greenhouse_brochure.pdf)

<sup>19</sup> Marz, W., & Sen, S. (2022). Does telecommuting reduce commuting emissions? *Journal of Environmental Economics and Management*, 116. Retrieved from [https://www.econstor.eu/bitstream/10419/248902/1/cesifo1\\_wp9357.pdf](https://www.econstor.eu/bitstream/10419/248902/1/cesifo1_wp9357.pdf)





\*2011 data for Loudoun County and City of Alexandria not available  
 Source: American Community Survey 1-Year Estimates

**FIGURE 8:** Commute mode by jurisdiction

During and after the pandemic, the City of Alexandria had a similar pattern to the rest of the region; telework increased and car and public transit commuting decreased. However, Alexandria's share of transit commuters did not decrease as much as its neighboring jurisdictions. While the total amount of public transit commuters in Alexandria decreased by 59% between 2019 and 2021, Arlington public transit commutes decreased by 79%, Fairfax County decreased by 71% and Loudoun County decreased by 84%. This may be related to DASH, Alexandria's bus agency, debuting a new network and free fares on September 5, 2021<sup>20</sup>. DASH has seen historic ridership growth<sup>21</sup> after going fare free and revealing the new network.

Fairfax County residents have a lower access to transit than Arlington and Alexandria<sup>22</sup>. However, public transit commuting increased between 2008 and 2019. This period includes the opening of Metro's Silver Line in 2014, which added five new stations to the three existing stations<sup>23</sup> in the county.

Both Loudoun and Prince William counties had a much higher percentage of car commutes throughout the study period. Both these counties have more diffused land use and much lower access to transit than the regional average<sup>24</sup>. Both counties also saw an increase in transit use over time, likely in part due to the increase in provided transit service, described in more detail in **Section 3.2**. Prince William, which is served by OmniRide and VRE, had a higher share of public transit use than Loudoun for the entire period. Both counties increased the share of public transit commuting between 2019 and 2021. While the overall number of public transit commuters decreased (in line with the rest of the region), the share of commuters using public transit grew. This trend is opposite to the regional average and the other jurisdictions in this study, which saw a decreased share of public transit commutes during that time. While in both cases, the increases were small, the decrease in the rest of the region indicates a reliance on transit commuting in Loudoun and Prince William.

## 3.2 Service Trends Over Time

This section uses agency service data to evaluate how transit service has changed over the study period.

### 3.2.1 Average Trip Length

While not a direct representation of travel in the region, average trip length is an indicator of the type of trip a transit user takes. **Figure 9** shows the average trip length over time by mode. Generally, commuter-oriented service have longer trip lengths than local transit trips that tend

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<sup>20</sup> <https://www.dashbus.com/sept5/>

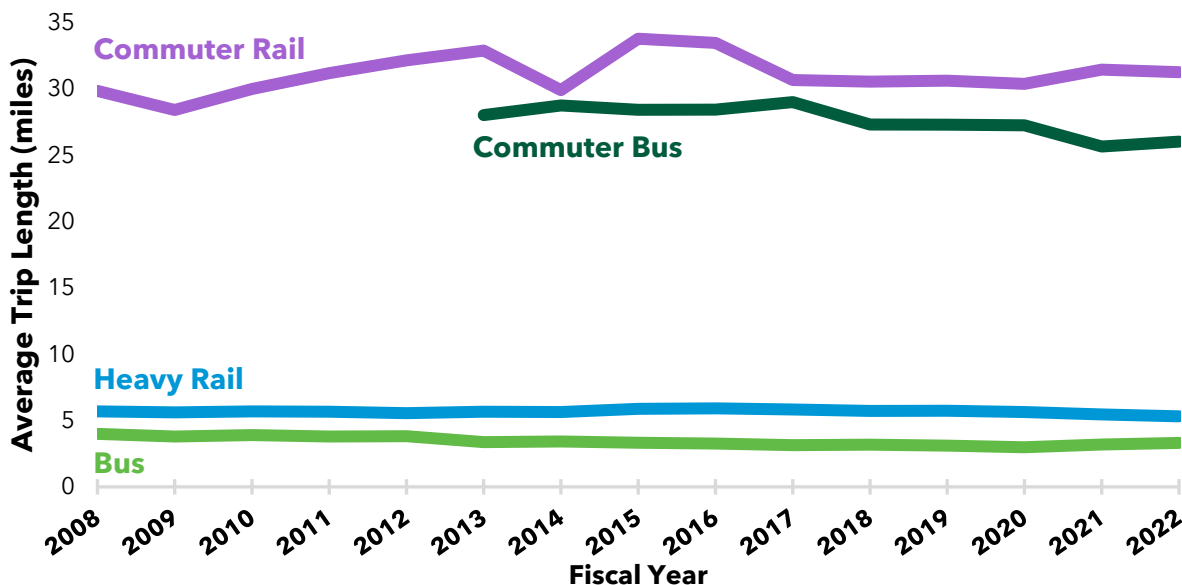
<sup>21</sup> [https://www.dashbus.com/wp-content/uploads/DASH-Fare-Free-Program-Report-FY-2022\\_FINAL.pdf](https://www.dashbus.com/wp-content/uploads/DASH-Fare-Free-Program-Report-FY-2022_FINAL.pdf)

<sup>22</sup> <https://novatransit.org/transit-dashboard/>

<sup>23</sup> [https://www.washingtonpost.com/local/trafficandcommuting/all-aboard-metros-new-silver-line-rolls-down-the-tracks-for-the-first-time/2014/07/26/238aaa68-14cc-11e4-8936-26932bcfd6ed\\_story.html](https://www.washingtonpost.com/local/trafficandcommuting/all-aboard-metros-new-silver-line-rolls-down-the-tracks-for-the-first-time/2014/07/26/238aaa68-14cc-11e4-8936-26932bcfd6ed_story.html)

<sup>24</sup> <https://novatransit.org/transit-dashboard/>

to serve a wider variety of mobility needs, as represented in **Figure 9**, where commuter bus service<sup>25</sup> and commuter rail have much longer trip lengths.



Source: National Transit Database

**FIGURE 9:** Average trip length by mode

While Loudoun County Transit and OmniRide both provide commuter bus service, the respective agencies responded to the pandemic in different ways. OmniRide continued to operate most commuter services while Loudoun County Transit cut commuter bus service when the pandemic began. This is likely why the average trip length decreased substantially between FY 2020 and FY 2021 for Loudoun County Transit. VRE service was relatively consistent over the period with some variability around FY 2014 and FY 2015. The VRE Spotsylvania station, the stop furthest south on the Fredericksburg line, opened in 2015<sup>26</sup>, which may contribute to the increase in trip length beginning that year.

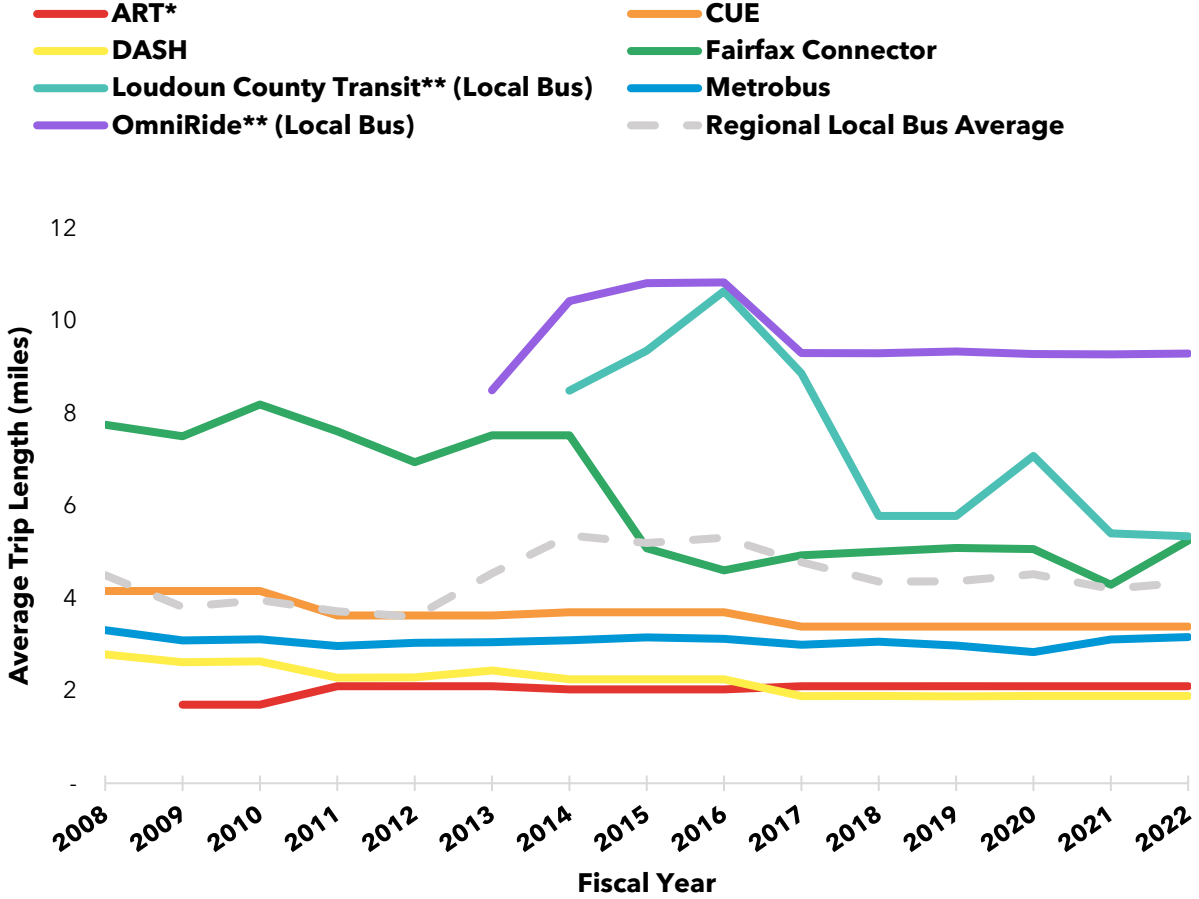
**Figure 10** displays average trip length for just each agency’s local bus routes. As the graph shows, agencies like ART, CUE, DASH and Metrobus have much shorter average trip lengths. These agencies have more localized service that operate in denser areas. Loudoun County Transit, Fairfax Connector, and OmniRide all have longer trip lengths. This is likely due to the differing land use in these service areas. Loudoun County, Fairfax County and Prince William County are farther from the denser suburbs of Arlington and Alexandria. The more sprawled

<sup>25</sup> Note that the NTD did not begin splitting out commuter bus as a mode until 2011, so commuter bus data is not available for the first four years of the study period.

<https://www.federalregister.gov/documents/2011/05/27/2011-13286/national-transit-database-amendments-to-urbanized-area-annual-reporting-manual>

<sup>26</sup> <https://www.washingtonpost.com/news/dr-gridlock/wp/2015/11/15/vre-spotsylvania-station-opens/>

land use of these outer regions means longer distances between destinations and therefore longer trip lengths.



\*ART data not available for FY 2008

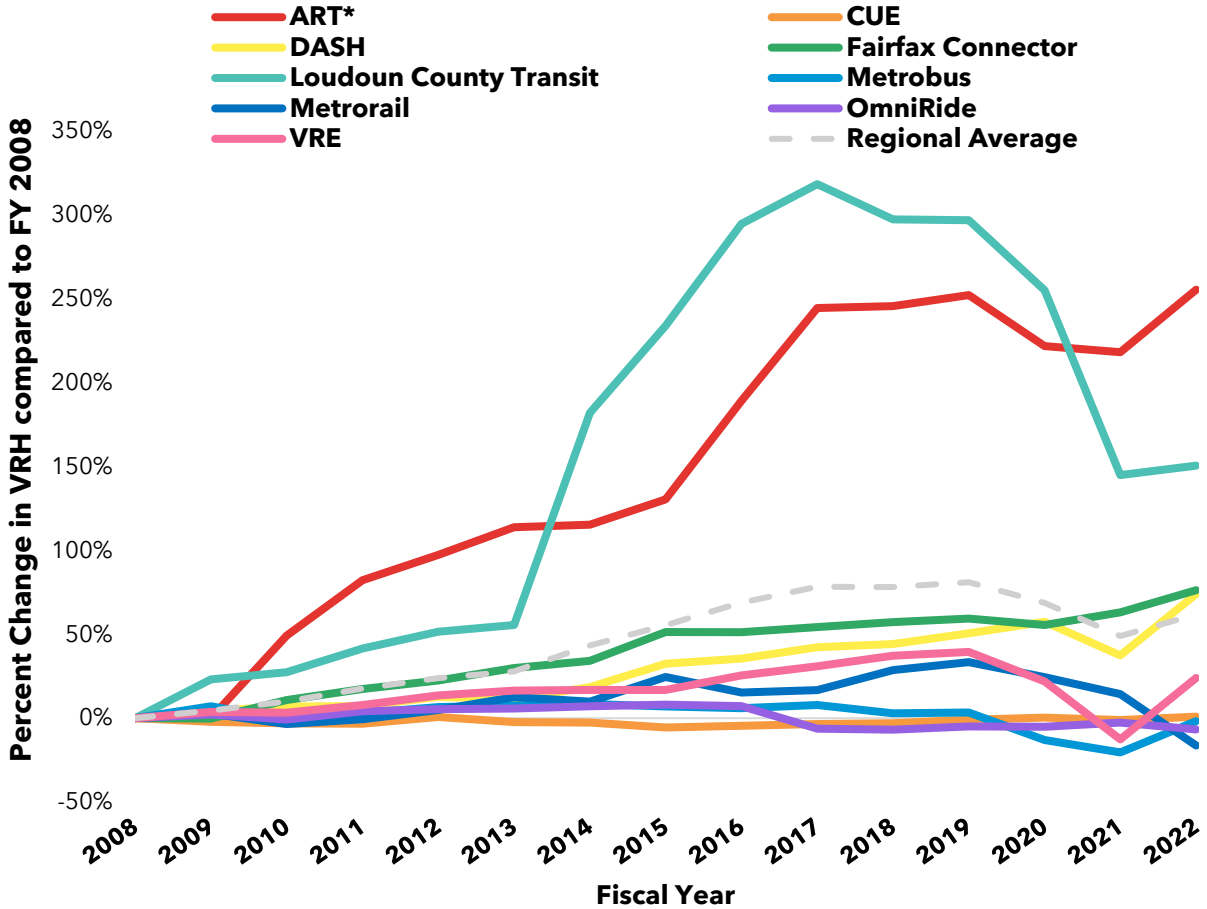
\*\*Before 2013, Loudoun County Transit and OmniRide reported local bus and commuter bus together

Source: National Transit Database

FIGURE 10: Average local bus trip length by agency

### 3.2.2 Revenue Hours

Another way to understand temporal travel trends is to look at the quantity of service provided over time. Has an agency increased its service or are agencies running a consistent amount of service over the last 15 years? Revenue hours are a useful metric to understand how supplied transit service can change. **Figure 11** shows trends lines for changes in revenue hours by transit agency. At the regional level, revenue hours increased over the period. By FY 2019 the region had 80% more hours of transit service than FY 2008 levels. As expected, there was a dip between FY 2020 and FY 2021 when the pandemic impacted service. Before FY 2020 and the pandemic, nearly all agencies provided more service each year after FY 2008.



\*ART percent change in VRH compared to FY 2009. ART data not available for FY 2008.  
 Source: National Transit Database

**FIGURE 11:** Percent change in vehicle revenue hours (VRH) since FY 2008

Metrobus and Metrorail have much higher revenue hours than the rest of the study’s agencies, as this system is substantially bigger and spans across Virginia, the district and Maryland. Increases in Metrorail service align with the introduction of new stations and lines. The first phase of the Silver Line, for example, opened in 2014. The greatest dip in service for both Metrorail and Metrobus was between FY 2019 and 2020, which aligns with the pandemic and pandemic-era service cuts. The Blue Line derailment in October 2021 (FY 2022) also led to service cuts as the 7000-series railcars were pulled from service<sup>27</sup>. Service has also been impacted during track and station platform renewal projects. These projects, which have affected Metrorail throughout this study period, have led to extended service suspensions. Metrobus revenue hours dipped below FY 2008 levels in FY 2020 and FY 2021. This aligns with

<sup>27</sup> <https://www.wmata.com/service/status/details/Metrorail-Service-and-Derailment-Investigation-Update.cfm>

Metro's adjustments to service levels during this time as they responded to pandemic-era safety protocols and workforce availability challenges<sup>28</sup>.

Fairfax Connector provides the most hours of service of all the Northern Virginia bus agencies. Over the 15-year period, Fairfax Connector increased its service by nearly 300,000 hours. ART had the largest percent change over time, from 50,791 revenue hours in FY 2009<sup>29</sup> to 161,479 revenue hours in 2022, an increase of 218%. In the most recent year of data, ART had service comparable to OmniRide (a much larger service area) and DASH (with a comparable service area and land use).

As **Figure 11** shows, Loudoun County Transit and ART each stand out. Both systems have experienced major increases in revenue hours within the last ten years. ART's increase in revenue hours can be partially attributed to its takeover of several Metrobus routes in the mid-to late-aughts, as well as a focused effort to expand their service network in the county<sup>30</sup>. By FY 2017, Loudoun County Transit increased its revenue hours by more than 300% compared to FY 2008. A review of Loudoun's revenue hours shows that since FY 1998, revenue hours had been steadily increasing until the introduction of local fixed route service in the system in October 2013<sup>31</sup>, at which point revenue hours increased at a much higher rate. As discussed in the previous section, Loudoun County Transit cut commuter service at the beginning of the pandemic, while OmniRide continued to run commuter bus routes. This is reflected in **Figure 11**, where Loudoun County Transit revenue hours decrease more substantially beginning in FY 2020 than OmniRide's compared to FY 2008 levels.

VRE, DASH and Fairfax Connector all increased service compared to FY 2008 levels. A closer look at VRE service levels shows that it peaked in FY 2019 at 42% increase in revenue hours compared to FY 2008. VRE revenue hours then dipped with the onset of the pandemic as commutes to the district and other employment centers moved to teleworking. Despite sharing track with freight rail and serving mostly peak travel commuters, VRE consistently added service over the study period prior to the pandemic. VRE has proposed Saturday service in its FY 2025 budget, which could further increase revenue hours in the coming years.<sup>32</sup>

The most consistent revenue hours in the region were provided by CUE and OmniRide. However, both also periodically had less service than in FY 2008. Beginning in FY 2017, OmniRide service levels were less than 2008 levels, however the percent change was never more than 7%. CUE revenue hours also fluctuated, though increases or decreases in service were never more than approximately 6%. Metrobus service levels decreased from FY 2008

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<sup>28</sup>

[https://novatransit.org/uploads/studiesarchive/2022%20Annual%20Report%20on%20WMATA2022\\_Alt.pdf](https://novatransit.org/uploads/studiesarchive/2022%20Annual%20Report%20on%20WMATA2022_Alt.pdf)

<sup>29</sup> Vehicle Revenue Hour data from NTD were not available for ART for 2008.

<sup>30</sup> For example, Arlington took over Metrobus 24P

[https://www.wmata.com/about/board/meetings/board-pdfs/upload/051106\\_11aFY07ServiceChanges.pdf](https://www.wmata.com/about/board/meetings/board-pdfs/upload/051106_11aFY07ServiceChanges.pdf)

<sup>31</sup> Loudoun County assumed responsibility for local fixed route service on October 1, 2013.

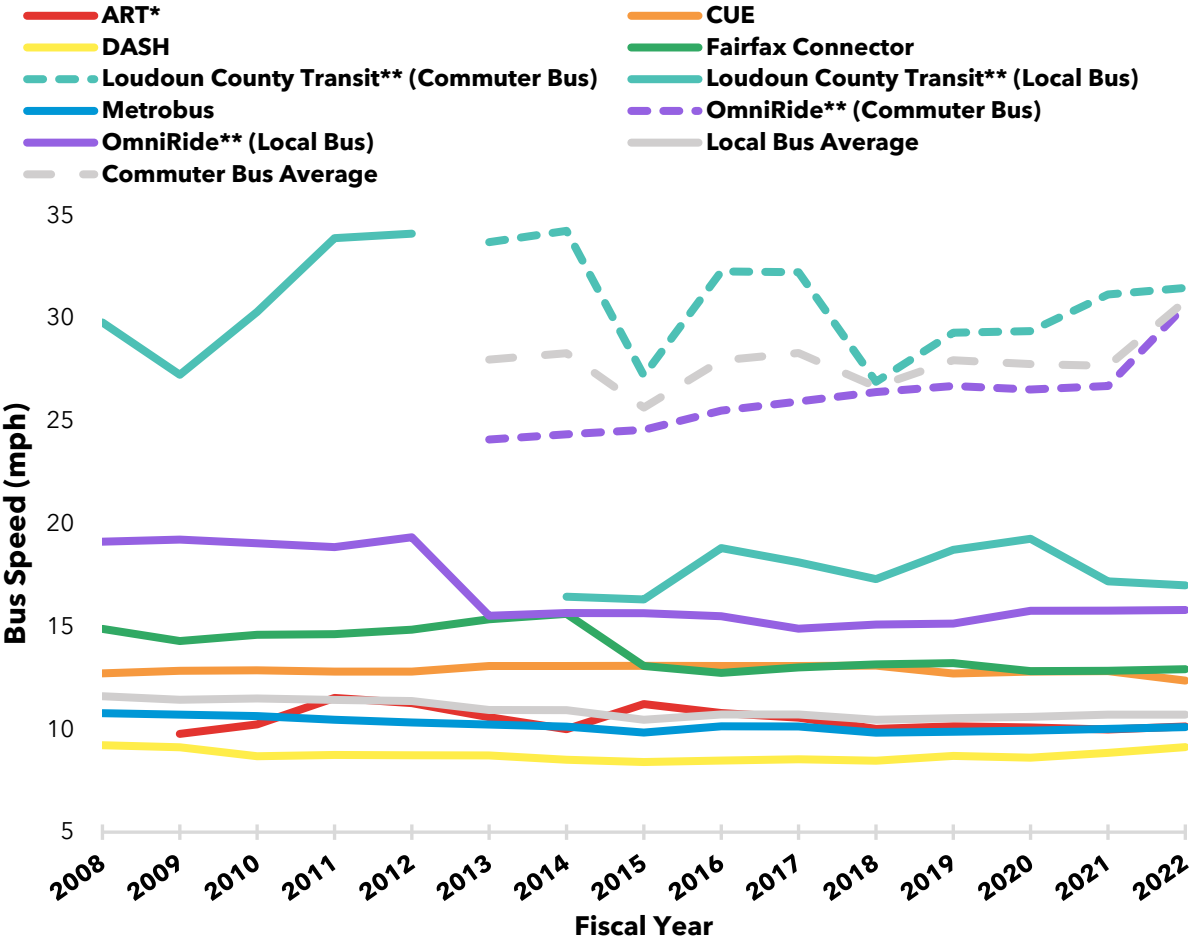
<https://www.loudoun.gov/DocumentCenter/View/122385/TDP-2018-2028-?bidId=>

<sup>32</sup> <https://www.washingtonpost.com/transportation/2023/10/27/vre-commuter-trains-saturday-service/>

levels in the last three years of the study period. This correlates with service cuts implemented by Metro at the beginning of the pandemic.

### 3.2.3 Bus Speeds

Tracking bus speeds can provide a general overview of how Northern Virginia’s congestion has changed over time. The bus speeds in this section are estimated and aggregated for an entire agency, so conclusions cannot be made about congestion and speeds on specific routes or in specific areas. **Figure 12** plots bus speeds over time, broken out by agency and mode. This data can provide insight into how speeds have generally changed over the study period. Local bus speeds decreased by 8% between FY 2008 and FY 2022. Commuter bus speeds increased by 10% between FY 2013 (commuter bus data was not available until FY 2013) and FY 2022.



\*ART data not available for FY 2008  
 \*\*Before 2013, Loudoun County Transit and OmniRide reported local bus and commuter bus together  
 Source: National Transit Database

**FIGURE 12:** Bus speeds by agency and mode

Congestion is likely a major contributor to the decrease in bus speeds over the study period. Between 2019 and 2022, Washington, D.C. driving speeds decreased by 33%<sup>33</sup>. Buses are stuck in the same traffic as cars, but carry more people, multiplying the number of people experiencing the traffic. Slow buses also cost transit agencies thousands of dollars<sup>34</sup>. The increase in commuter bus speeds over time correlates with the opening of the Express Lanes<sup>35</sup> on I-495 (2012), I-95 (2014) and I-395 (2019). With all three of these high occupancy toll (HOT) lanes becoming available during this period, commuter buses had the opportunity to avoid congested highways and increase speeds.

## 3.3 Transit Trends: A Snapshot of Regional Movement

### 3.3.1 Trip Mode

This section evaluates spatial trends for Northern Virginia transit. As discussed above, the RTS is a survey of a weekday that is then extrapolated for the region. This means that the data in this section are estimations. Further, as this survey only represents one day of travel, conclusions on weekend trends cannot be made. In this section, we first use trip mode to understand *how* people move across the region, and then trip purpose to understand *why* people move across the region.

The RTS data includes 80 million trips from the entire Greater Washington region, more than 48 million of which began or ended in Virginia. Broken down by mode, 84% of Virginia trips were by car and 9% were by transit. Further analysis shows that only 19% of Virginia trips were for commuting, indicating that most movement across the region isn't for commuting. **Figure 13** shows the share of trips in the entire region (left) and the breakdown of the transportation modes used in Virginia (right).

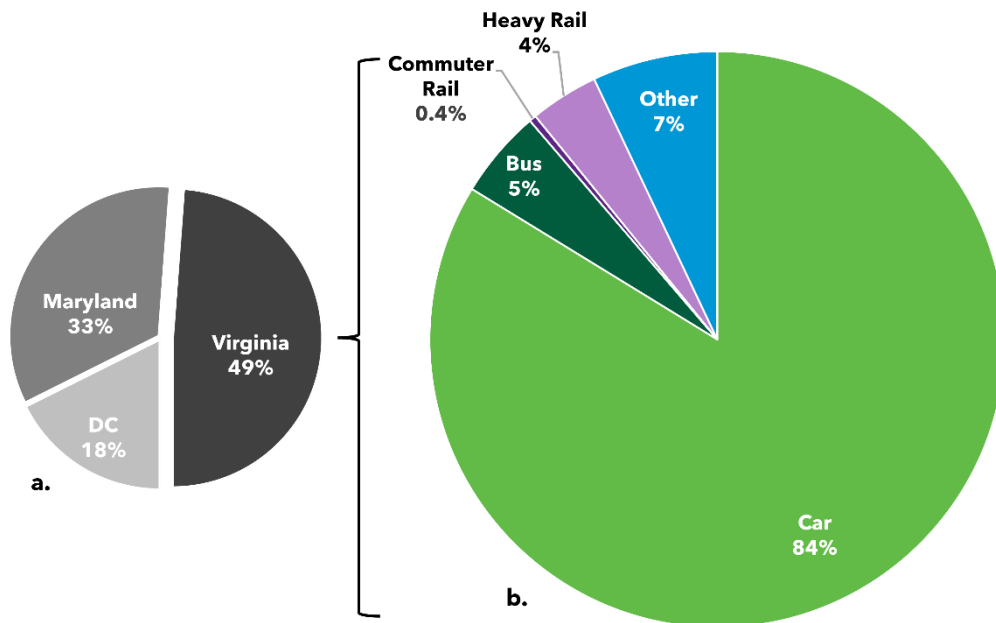
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<sup>33</sup> <https://inrix.com/scorecard-city-2022/?city=Washington%20DC&index=20>

<sup>34</sup> <https://novatransit.org/uploads/studiesarchive/NVTC%20Report%20-%20Advancing%20Bus%20Priority.pdf>

<sup>35</sup> <https://www.expresslanes.com/about>





Source: MWCOG/TPB 2017 Regional Travel Survey

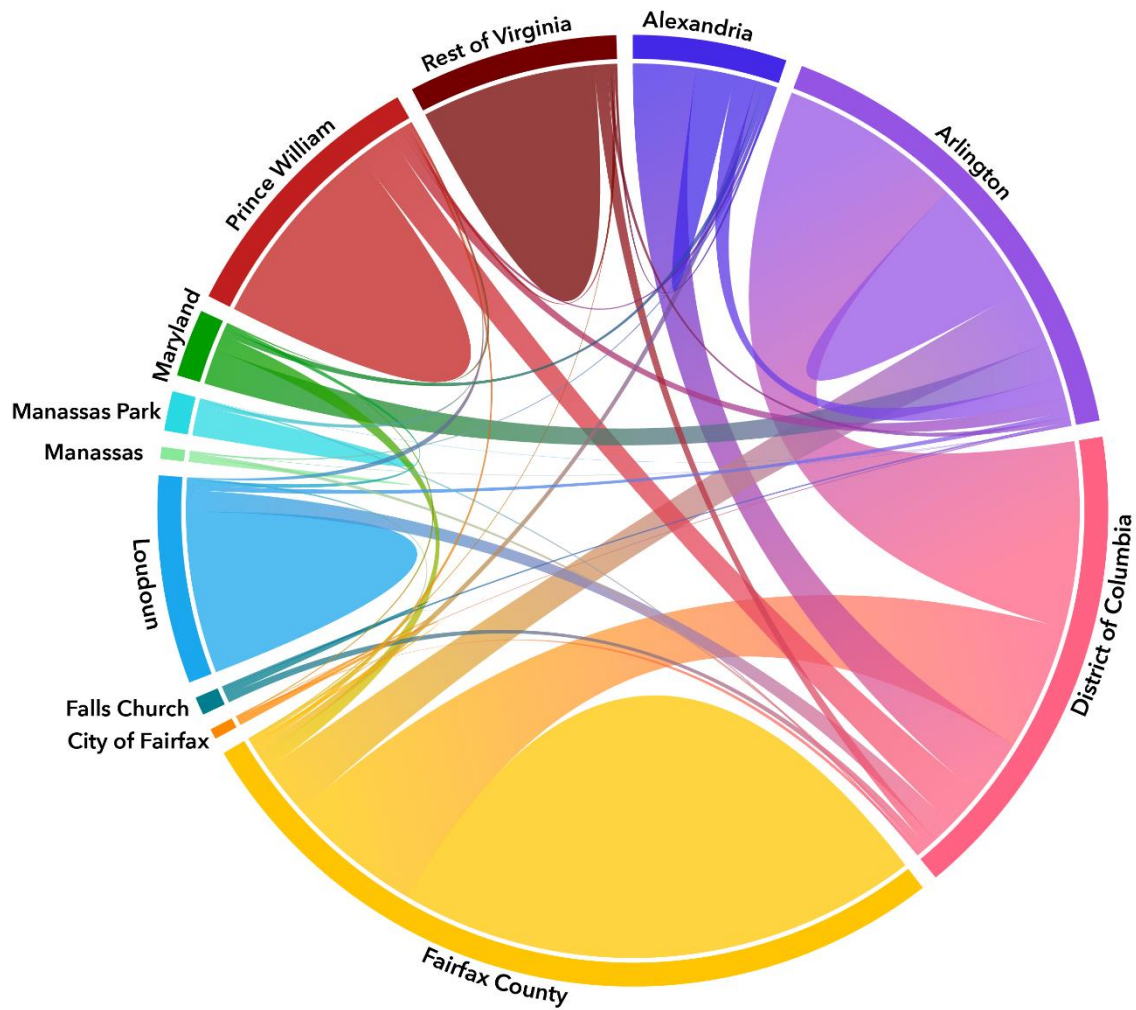
**FIGURE 13:** (a) Share of trips beginning or ending in Virginia, DC and Maryland and (b) breakdown of trip mode for trips beginning or ending in Virginia

Trip mode varies by region and direction of travel. While travel between Northern Virginia and other jurisdictions is one of the least car-dependent in the Greater Washington region, trips that stay entirely within Virginia were the most car-centric. Public transit is used more for traveling to other parts of the region, while cars are used to travel within Virginia. Trips between Virginia and the district have a higher share of rail and bus use than between Virginia and Maryland and within Virginia.

**Figure 14** visualizes movement beginning or ending in Virginia using a chord diagram; the wider the connection between two locations, the greater the number of trips. As expected, public transit trips are heavily connected to the district. The larger share of Fairfax County trips is also unsurprising considering it's the most heavily populated county in the region. On the other hand, Arlington has a relatively small population compared to its share of public transit trips. This ties back to the commuting trends discussed above; nearly one third of commuters used public transit in the county. Arlington is highly connected by public transit, served by Metrorail, VRE, Metrobus, ART, DASH, Fairfax Connector, Loudoun County Transit, and OmniRide. There is a link between the amount of service provided and ridership<sup>36</sup>. Arlington is highly served by transit, and this is reflected by Arlington's larger share of public transit trips. In the region overall, there are less public transit connections between Virginia jurisdictions. Public transit service and infrastructure is more robust between Virginia and the district than

<sup>36</sup> <https://novatransit.org/uploads/studiesarchive/2022NoVaCOVIDTransitReport.pdf>

other parts of the region. While there are current projects underway that address this concern<sup>37</sup>, this report further highlights the need for more transit connections within Virginia, and between Virginia and Maryland.



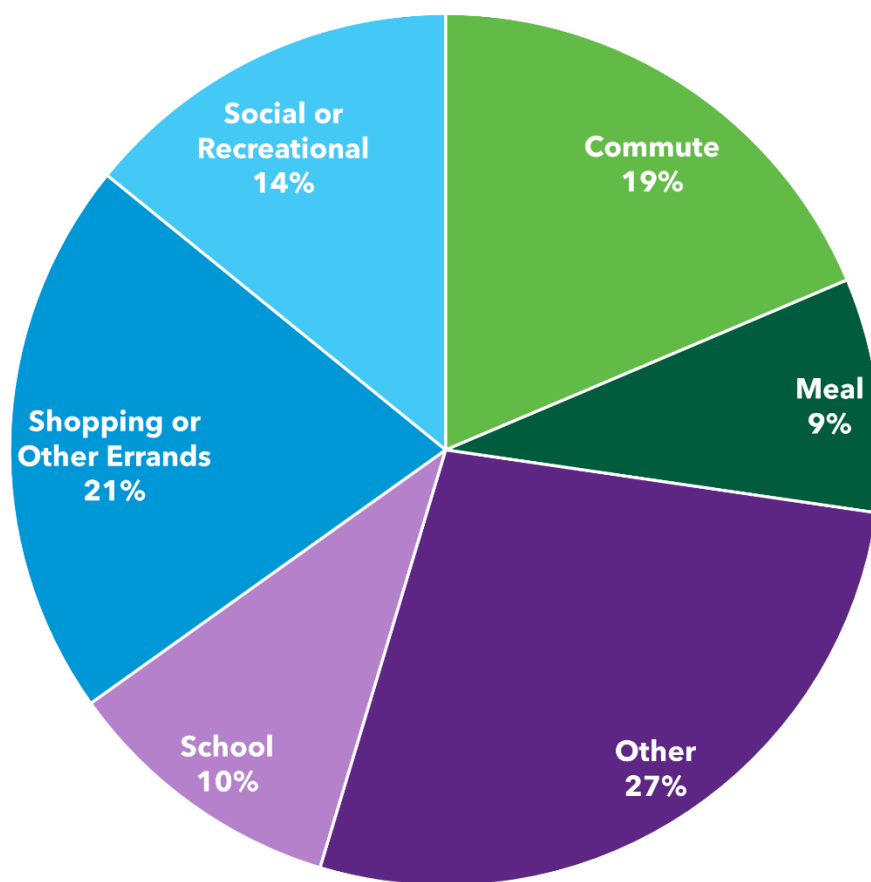
Source: MWCOG/TPB 2017 Regional Travel Survey

**FIGURE 14:** Public Transit trips beginning or ending in Virginia

<sup>37</sup> <https://drpt.virginia.gov/studies-and-reports/i-495-american-legion-bridge-transit-tdm-study/>

### 3.3.2 Trip Purpose

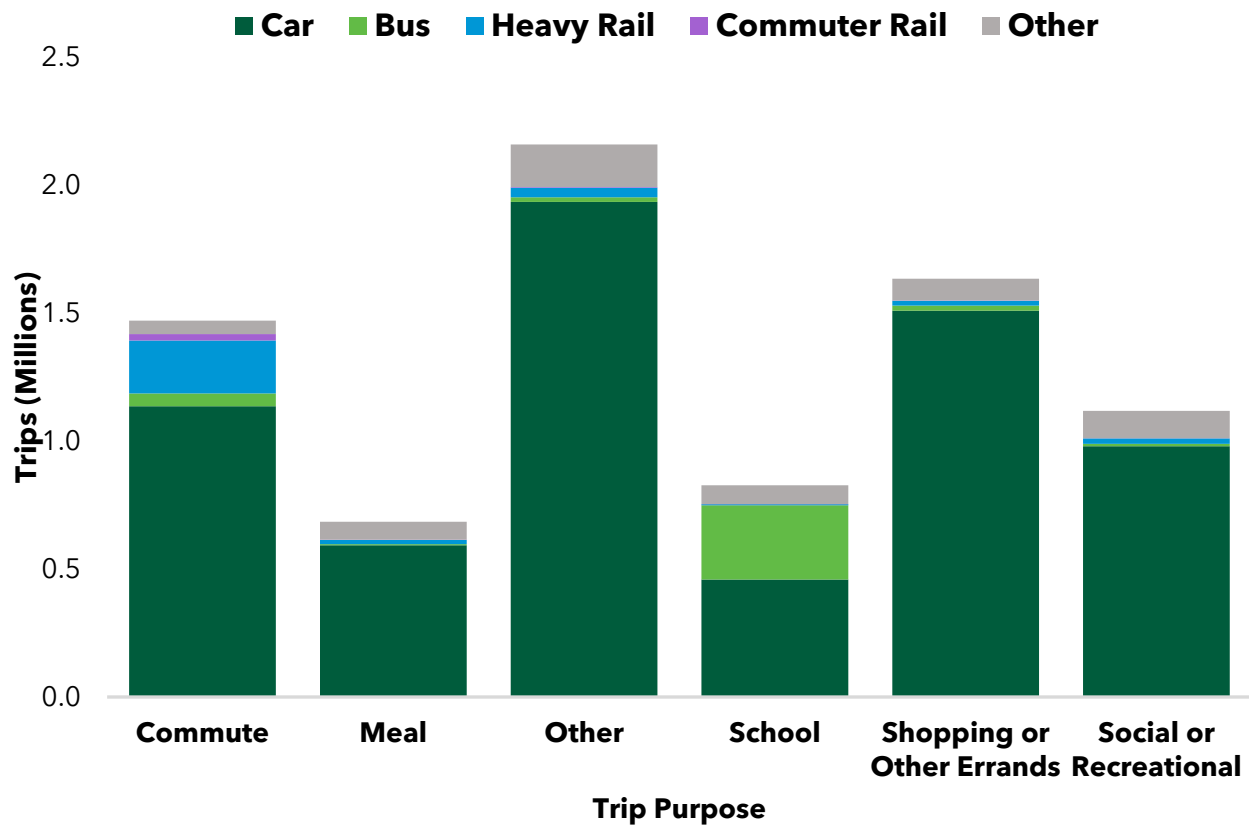
Why people move across the region is just as important as how people move. While ACS commute data provides valuable insights into the movement of workers, the RTS goes beyond commutes to provide a broader picture of how people move throughout the day, be it for work, errands, shopping or fun. **Figure 15** breaks down trips beginning or ending in Virginia into six trip purpose categories. Of all trips to and from Northern Virginia, 19% were classified as commute trips. However, there were 290 unique pairs of origin-destination activities reported in the RTS. This is a reminder that movement within the region is more than just commutes. Further, commuting in the region has slowly shifted with the development of new employment clusters in Tysons, Dulles, and Fort Belvoir. While this is not represented in the RTS data from 2017, it is something to track in future studies.



Source: MWCOG/TPB 2017 Regional Travel Survey

**FIGURE 15:** Trip purpose for trips beginning or ending in Virginia

**Figure 16** further breaks down the mode used for each trip purpose category. The share of public transit for commuting was much higher than for all the other trip purpose categories; 21% of commute trips used public transit. Nearly 90% of trips for all other categories (excluding school which had a high share of bus use) were made by cars. The car is the primary mode of transportation across the region, but especially for non-work-related trips. While these data were collected prior to the pandemic, these findings highlight a larger trend in the transit industry where transit services have disproportionately focused on commutes. These results show that there is a significant need for travel around the region outside of peak hours, highlighting an opportunity for growth and change.



Source: MWCOC/TPB 2017 Regional Travel Survey

**FIGURE 16:** Purpose and mode of trips beginning or ending in Virginia

## 4. Conclusions

This report aimed to assess Northern Virginia transit trends over the last 15 years to understand how transit use has evolved over time, and with a snapshot of one year to greater understand the spatial elements at play. Evaluating public transit travel trends over time and space can provide valuable insight into the needs of the region. The use of public transit for commuting in the region remained relatively consistent before the pandemic and is now recovering.

However, rates of ridership recovery change depending on mode and jurisdiction. The overall quantity of public transit service increased over time, although there were type and length of service shifts. Over the same period, bus speeds decreased. The report also found public transit is used most often for commutes and for connecting into the district. Overall, public transit is an important part of the region, especially for commuters. The effects of the pandemic have emphasized the need for more transit connections throughout the day, not just during peak periods. Now that telework and hybrid work have become more common, there is an even greater need for transit agencies to focus on attracting and serving riders outside of the traditional peak-period travel windows.

## Key Takeaways

There are three key takeaways from this report that can help guide regional leaders and planners in decision-making.

**Transit has been disproportionately used for commuting, however most trips in Northern Virginia are not work related. Transit agencies should investigate options to better meet non-commute travel.**

This report found that both from a data collection perspective as well as planning perspective, there has been an overemphasis on commuting. For example, the census data used in this report are limited to commuting and doesn't collect information on other travel. Previous reports have also noted the distinct peaks of transit service and the overemphasis on peak period transit service<sup>38</sup>. Public transit service has been planned around the cycles of peak-off peak travel, but more than 80% of trips taken in the region aren't work-related. A Northern Virginia resident isn't only going to and from work. And work trips don't necessarily follow the 9 to 5 pattern. They are also going shopping, getting a haircut, or going out to meet friends for dinner. Transit can and should be a viable option for getting around for any of these activities throughout the day. Transit oriented around peak period travel should be reconsidered

**The region's buses have slowed down. Northern Virginia should invest in opportunities to speed them up with dedicated bus lanes, queue jumps and transit signal priority.**

The average speed of non-commuter buses has slowed over the last 15 years. Congestion in the region has also gotten worse. Investment and implementation of bus priority treatments cannot fix the overarching congestion problem, but they can help move buses and their passengers more efficiently around the region.

**Many transit riders use routes that take them outside of Northern Virginia to the District of Columbia and Maryland. Local transit agencies should prioritize options that can help move more people inside Northern Virginia.**

Most movement within the Northern Virginia region is by car. This trend is even more prominent with activities outside of work. This study highlights the gap in public transit service that creates

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<sup>38</sup> <https://novatransit.org/uploads/studiesarchive/2022NoVaCOVIDTransitReport.pdf>

connections within Virginia. With more transit service available, ridership is likely to follow. NVTC’s Northern Virginia Regional Bus Analysis and the Envision Route 7 BRT project, and Metro’s Better Bus Network Redesign<sup>39</sup> are all examples of ongoing work to help create a more robust transit network within Northern Virginia.

## Appendix

### Commuting Trends Mode Simplification

The original census table provides more detailed information on commute modes than was necessary for this analysis, so a more simplified mode matrix was created. **Table 1** identifies the mode listed in the census and the associated simplified mode used for this study.

**Table 1:** Simplified commute modes

<b>Census Means of Transportation to Work</b>	<b>Simplified mode</b>
Car, truck, or van	Car
Public transportation (excluding taxicab)	Public Transit
Taxicab	Other
Motorcycle	Other
Bicycle	Other
Walked	Other
Other means	Other
Worked from home	Work From Home

### Service Trends Calculations

$$\text{Average Trip Length} = \frac{\text{Passenger Miles Traveled}}{\text{Ridership}}$$

$$\text{Bus Speed} = \frac{\text{Service Miles}}{\text{Service Hours}}$$

### RTS Data Cleaning

The raw RTS trip data included missing variables that would affect findings, so any entry that had missing origin, destination or travel mode data was removed in the data cleaning process. This removed 18.55% of the original entries, leaving a dataset of 103,344 rows.

<sup>39</sup> [https://www.betterbusexperience.com/downloads/routes/VisionaryNetworkSummary\\_VA.pdf](https://www.betterbusexperience.com/downloads/routes/VisionaryNetworkSummary_VA.pdf)

## Trip Mode Simplification

Similar to the census data, the provided trip modes provided in the RTS were more detailed than was needed for this study. **Table 2** provides the original trip modes and the simplified versions used for this study.

**Table 2:** Simplified modes from the RTS trip mode matrix

RTS TRIP MODE	MODE SIMPLIFIED
LOCAL BUS	Bus
EXPRESS COMMUTER BUS	Bus
SHUTTLE BUS	Bus
SCHOOL BUS	Bus
INTERCITY BUS	Bus
CHARTER BUS	Bus
DRIVE ALONE	Car
DRIVE OTHERS	Car
AUTO PASSENGER	Car
RIDE HAILING	Car
TAXI	Car
COMMUTER RAIL	Commuter Rail
PARATRANSIT	Other
WALK	Other
BIKE	Other
AIR	Other
WATER	Other
OTHER	Other
MOTORCYCLE	Other
SUBWAY	Rail
LIGHT RAIL	Rail
INTERCITY RAIL	Rail

## RTS Trip Purpose Simplification

To determine a trip purpose, each origin-destination activity pair was assigned a general trip purpose: Commute, Meal, School, Shopping or Other Errand, Social or Recreational, or Other. There were 290 unique pairs of origin trip activities and destination trip activities that were simplified into six trip purpose categories: Commute, Shopping or Other Errands, School, Meal, Social or Recreational, or Other. **Table 3** provides examples of trip activity origin-destination pairs and the corresponding trip purpose.

**Table 3** : Trip purpose and examples of activity origin-destination pairs

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<b>TRIP PURPOSE</b>	<b>EXAMPLE ACTIVITY ORIGIN-DESTINATION PAIR</b>
<b>COMMUTE</b>	Work-Home
<b>SHOPPING OR OTHER ERRANDS</b>	Civic/Religious-Shopping, Non Shopping Errand-Non Shopping Errand
<b>SCHOOL</b>	Home-School, Meal-School
<b>MEAL</b>	Work-Meal, Exercise-Meal
<b>SOCIAL OR RECREATIONAL</b>	Home-Civic/Religious, Volunteer-Home, Home-Exercise
<b>OTHER</b>	Work-Drop off/Pick up, Gas-Home