

**Bicycling in the Washington, DC Region:  
Trends in Ridership and Policies since 1990**

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Please cite this book chapter as:

**Buehler, R., Stowe, J. 2015. "Bicycling in the Washington, DC Region: Trends in Ridership and Policies Since 1990," In: Hyra, D., Prince, S. (eds.) *Capital Dilemma: Growth and Inequality in Washington, DC*. New York: Routledge, 180-206.**

**Abstract**

This chapter documents and compares cycling policies and trends in the Washington, DC area. It focuses on the time period since the late 1990s when the District of Columbia's population and economy increased strongly. The goal is to gain a better understanding of variability and determinants of cycling in the metropolitan region. Data originate from the Metropolitan Washington Council of Government (MWCOG) Household Travel Survey, the U.S. Census Bureau, and information obtained directly from local bicycling experts. During the last 20 years, cycling levels and cyclist safety have been increasing in the Washington region. Bicycle planning in the region has its roots in the 1970s, but experienced a hiatus in the 1990s, and has witnessed a 'renaissance' since the late 1990s. In the 1970s and 1980s, local jurisdictions focused their bicycle policies on the provision of off-street paths—often shared with pedestrians. Since the late 1990s, all jurisdictions have greatly expanded their on-street bicycle lanes and implemented other innovative programs. Washington, DC, Alexandria City, and Arlington County have implemented more bike-friendly policies and have been at the forefront of experimenting with innovative measures. In spite of the progress, many challenges for cycling remain. Area cyclists are predominantly male, between 25 and 65 years old, White, and from higher income groups. Cycling appears to be spatially concentrated in neighborhoods of the urban core jurisdictions that experienced strong population growth. Moreover, the network of bicycle paths and lanes is still fragmented and often requires cyclists to mix with heavy or fast moving car traffic.

**Keywords: bicycling, Washington, DC, National Capital Region, policy, trends, sustainable transport**

## **Bicycling in the Washington, DC Region**

By Ralph Buehler and John Stowe

### **Introduction<sup>1</sup>**

Governments of large cities in the U.S. and Western Europe have the goal to encourage more bicycling to help alleviate peak hour congestion on roadways and public transport, reduce CO<sub>2</sub> emissions, improve local air pollution, combat oil dependence, and enable health-enhancing physical activity as part of the daily travel routine (Banister, 2005; Buehler, Pucher, Merom, & Bauman, 2011; Heinen, Van Wee, & Maat, 2010). For the last 20 years, cycling levels have been increasing in several major U.S. cities—including Washington, DC. The District of Columbia witnessed an increase from 0.8 percent of commuters regularly commuting by bicycle in 1990 to 3.2 percent in 2008-2012 (USDOD, 2014). Washington, DC's bicycle commute trends in the last two decades are comparable to other large U.S. cities including Denver, San Francisco, Seattle, Minneapolis, and Portland.

This chapter describes bicycling trends and policies in the urban core and inner suburban jurisdictions of the Washington, DC metropolitan area. The goal is to gain a better understanding of the variability and determinants of cycling within the Washington, DC metropolitan area. Data for this analysis originates from the Metropolitan Washington Council of Governments (MWCOG) Household Travel Surveys of 1994 and 2007/2008, the U.S. Census Bureau, and information obtained directly from local bicycling planners<sup>2</sup>. The chapter first introduces trends in cycling levels, cyclist demographics, and cyclist safety in the urban core (DC, Alexandria, and Arlington County) and inner suburban (Fairfax, Montgomery and Prince George's Counties) jurisdictions of the Washington, DC region. The remainder of the chapter provides an in-depth comparison of trends and differences in bicycle planning, bicycle infrastructure, and programs across jurisdictions in the region.

### **Trends in Cycling in the Washington, DC Region**

*The Study Area: The Washington, DC Region*

Table 3.1 provides an overview of socio-economic and spatial characteristics of the urban core and inner suburban jurisdictions of the Washington, DC region (MWCOG, 2009). The socio-economic characteristics, such as income and race, associated with biking rates are presented. Median household incomes in the region are higher than the U.S. national average of \$53,000 (USDOD, 2014). Even Washington, DC—the least wealthy jurisdiction in this study—had a median household income that was 21 percent higher than the national average. Higher household incomes in the Washington area are partially offset by 40 percent higher costs of living compared to the national average for urban areas (USDOD, 2014). Municipal averages hide large income discrepancies within jurisdictions. For example, in Washington, DC median household income east of the Anacostia River was only \$34,966 in 2008-2012—well below the national median (USDOD, 2014). Table 3.1 also shows that DC area jurisdictions have higher shares of minority populations than the national average of 26 percent. Washington and Prince George's County are African American majority jurisdictions at 51 percent and 64 percent respectively.

Table 3.1 also lists population density, share of households without cars, percentage of university and college students in the population, and Metrorail stations per inhabitant for each jurisdiction, because these variables are significant correlates of bicycling and bike commuting (Heinen et al., 2010; K.J. Krizek, Forsyth, & Baum, 2009). Higher population density serves as a proxy for shorter distances between trip origins and destinations. Washington, Arlington, and Alexandria have three to four times greater population densities than suburban Fairfax, Montgomery, and Prince George’s County.

University students have been found to cycle more than the adult population as a whole. Students account for 8 percent to 12 percent of the population in Washington, DC area jurisdictions. Individuals in households without automobiles are also more likely to cycle. Causation may run both ways, since individuals who prefer cycling may decide not to own an automobile. The share of carless households in Washington, 37 percent, is eight times greater than in Fairfax County, where only 4 percent of households are carless. In the other jurisdictions roughly 10 percent of households are carless. The high share of households without cars in Washington, DC may be partially explained by the accessibility provided by the Metrorail and bus systems (APTA, 2014). Moreover, in parts of the District with high poverty rates many households may not be able to afford the cost of owning and operating an automobile.

Jurisdiction	Population	Land Area (square miles)	Population per Square Mile	Percent of University Students	Percent of Car-Free Households	Percent White	Household Median Income	Metro Rail Stops per 100,000 Inhabitants
Washington	605,759	61	9930	12%	37%	40%	\$64,267	6.6
Arlington	209,077	26	8041	9%	12%	71%	\$102,459	5.3
Alexandria	140,337	15	9356	9%	10%	64%	\$83,996	2.1
Fairfax	1,083,770	395	2744	8%	4%	64%	\$109,383	0.6
Montgomery	974,824	495	1969	8%	8%	58%	\$96,985	1.1
Prince George's	865,443	485	1784	10%	9%	22%	\$73,568	1.7

**Table 3.1 Socio-demographic and spatial characteristics of Washington, DC and adjacent jurisdictions, 2008-2012.** Sources: (MWCOG, 2009; USDOC, 2014).

*Trends and Geographic Variability in Cycling Levels and Trip Purpose*

Over the last 20 years, cycling levels have been increasing in the Washington area (see Table 3.2) (MWCOG, 2010; TPB, 2006, 2010a; USDOC, 1980-2000, 2014). Between 1994 and 2008, the bike share of all trips increased in all jurisdictions except Fairfax County (MWCOG, 2010; TPB, 2010b). Both in 1994 and 2008, Washington had the highest share of trips by bike among all jurisdictions in the area—followed by Alexandria. In addition to the MWCOG survey results for 1994 and 2008, the U.S. Census Bureau tracks the regular mode of transportation for commuters for each jurisdiction (see Table 3.2). Between 1990 and 2008-2012 (averaged), the number of regular daily bike commuters increased almost three-fold in the region—from 6,086 to 16,980 (USDOC, 2014). The number of regular daily bike commuters increased fourfold in the District of Columbia and more than twofold in Alexandria City, Arlington County, and Montgomery County. In spite of the strong increases in the number of bike commuters, in 2008-2012 cyclists accounted for a small share of overall commuters: 3.2 percent in Washington, DC, 1.2 percent in Arlington County, 1.0 percent in Alexandria, and 0.5 percent or less in the other jurisdictions.

Local counts of bicyclists on bridges and trails also support the apparent increase in cycling levels over the last 20 years. For example, counts of commuters show an increase in cyclists entering downtown Washington from 800 daily cyclists in 1986 to 3,310 in 2013 (DDOT, 2011-2014; TPB, 2006, 2010a). Another count shows a more than twofold increase in peak hour cyclists entering the urban core of Washington and Alexandria between 1999 and 2013 (TPB, 2010a, 2014). Local travel surveys and counts, however, cannot be interpreted as representative of the population. Also, results are often incomparable over time and across jurisdictions.

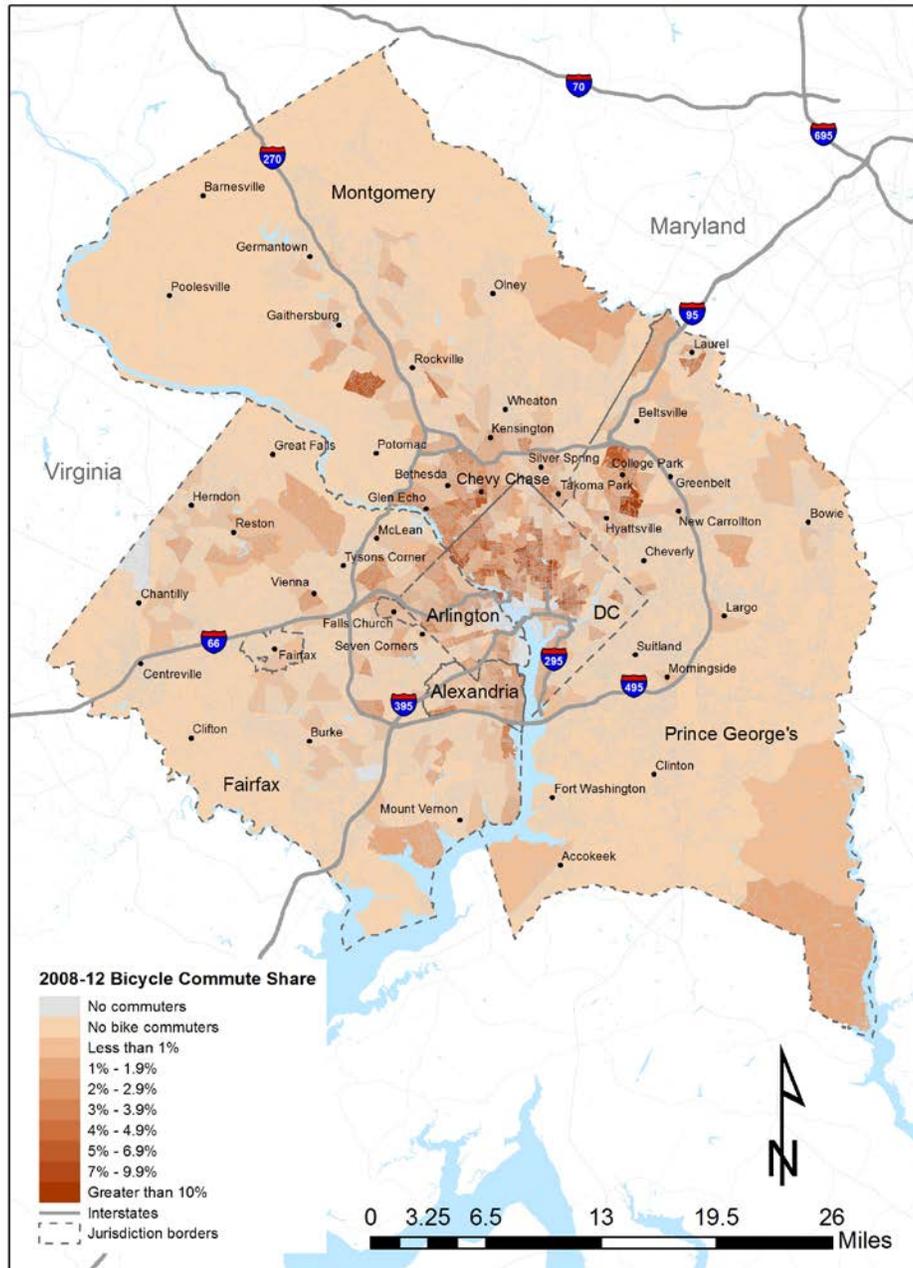
	Bicycle Share of all Trips (%)		Number of Regular Daily Bicycle Commuters		Bicycle Share of Regular Commuters (%)	
	1994	2008	1990	2008-2012	1990	2008-2012
Washington, DC	1.3	1.5	2,292	9,347	0.8	3.2
Alexandria City	0.6	1.1	359	864	0.5	1.0
Arlington County	0.5	0.8	661	1,621	0.6	1.2
Fairfax County	0.5	0.3	967	1,453	0.2	0.3
Montgomery County	0.4	0.6	916	2,350	0.2	0.5
Prince George's County	0.2	0.4	891	1,344	0.2	0.3

**Table 3.2 Trend in bicycling levels for all trips and among regular commuters in Washington, DC and adjacent jurisdictions, 1990 to 2008-2012.** *Source: (MWCOG, 2010; USDOT, 2009, 2014)*

The analysis so far hides the variability in cycling levels within the six jurisdictions. The sample size of the MWCOG regional travel survey is not large enough to disaggregate results for all trip purposes. Even though small sample sizes for bike commuting on the census tract level cast some doubt on the reliability of Census Bureau data, the data can serve as a proxy for the regional variability in cycling (see Figure 3.1). Bike commute levels are highest in census tracts inside the Capital Beltway (Interstate 495). Census tracts in College Park, Rockville, and Bethesda have the highest cycling commute levels of the Maryland suburbs. Old Town Alexandria and Arlington County’s Crystal City and Rosslyn-Ballston Corridor have the highest bike commute shares for Northern Virginia. Within Washington cycling commute shares are highest in the Capitol Hill, Columbia Heights, Adams Morgan, Mount Pleasant, Palisades, and U Street neighborhoods. Even in the most bicycle-oriented census tracts bike commuting rarely accounts for more than 5 percent of regular commuters.

In general bike commute levels are lower in areas farther from the regional core, in hilly terrain, and in census tracts including or adjacent to light manufacturing, cemeteries, airports, interstate highways, or large bodies of water. In the Washington, DC region, as in many other U.S. regions, many low-income and residentially segregated neighborhoods are within close proximity to those types of land uses. Within the urban core, cycling levels are lowest east of the Anacostia River, north-east of the District, between the Rosslyn Ballston Corridor and I-395 in

Arlington, and along the western part of Alexandria adjacent to I-395.



**Figure 3.1** Variation in the share of regular bike commuters in the Washington, DC region, 2008-2012. *Source:* own analysis of (USDOC, 2014) . *Note:* Map created by J. Stowe

The results presented below disaggregating the MWCOC data by socioeconomic and demographic groups suffer from small sample size (only 100 cyclists reporting 418 bike trips for the entire MWCOC sample), but are presented using 99 percent confidence intervals estimated using the small sample available. The data should only be interpreted as rough indicators for differences in actual cycling levels between population sub-groups.

In the Washington, DC region there are disparities among cyclists by gender, age, income, and race. In 2008/2009 cycling in the Washington region seems slightly less male dominated than in other urbanized areas in the U.S.: 27-39 percent of bike trips in the Washington area were by women compared to 25 percent nationally. The age of cyclists also differs. Nationally, almost 50 percent of bike trips are made by individuals between 5 and 24 years old. In Washington the majority of bike trips (64-75 percent) were made by 25 to 65 year olds. Cyclists in Washington seem to be wealthier than the national average. The wealthiest 25 percent of the population makes 35 to 47 percent of bike trips in Washington compared to 26 percent of bike trips nationally. Lastly, cycling in the Washington region seems to be dominated by Whites, who accounted for 84 to 92 percent of all bike trips in 2008 (vs. 77% nationally). African Americans only accounted for 3.0-9.0 percent of bike trips recorded in the MWCOG Survey (vs. 11 percent nationally), despite accounting for a higher share of the regional population than the national average.

Overall, MWCOG data suggest that Whites cycle at much higher rates than African Americans in the Washington, DC region. This aligns with low bike commute levels in predominantly African American census tracts east of the Anacostia River. However, these findings are based on small samples. National level data for all trips suggest similar cycling rates for both Whites and African Americans. By contrast, the 2008-2012 American Community Survey (ACS) data suggest that bike commute rates for Whites are twice as high as for African Americans, but very low for both groups and therefore differentiated by only 0.3 percentage points (0.6 percent vs. 0.3 percent of commuters). Unfortunately, the available data do not allow further investigation of similarities and differences of racial/ethnic groups by socio-economic status, demographic factors, or geography.

An exploratory study by American University researchers (Bratman & Jadhav, 2014) analyzed barriers to cycling among 260 DC residents in Wards 7 and 8, where the residential population is 95 percent African American. Barriers to cycling identified in this study were similar to barriers commonly cited for the population in general, including trip distance, lack of separate facilities like lanes or paths, physical safety, comfort, theft, or travel speed. One of the key study findings was that respondents in Ward 7 and 8 had a higher desire for owning a car than other racial/ethnic groups. The authors speculate that car ownership is related to higher social status for their sample of respondents.

## **Trends in Cycling Policy in the Washington, DC Area**

### *A Brief History of Bicycle Planning*

Modern planning for bicycling in the Washington region started in the 1970s, progressed very slowly in the 1980s, experienced a hiatus in the 1990s, and saw a revival since the early 2000s. In 1972 the Washington Area Bicycle Association (WABA), the region's largest pro-bicycling lobbying organization, was formed (Hanson & Young, 2008; WABA, 2010-2014). During the 1970s, local jurisdictions and the regional planning board published their initial bicycle plans in subsequent years: Alexandria City and Arlington County in 1974; Washington and Montgomery County in 1978, and the regional Transportation Planning Board (TPB) in 1977 (Bike Arlington, 2011; City of Alexandria, 2011a; DDOT, 2005, 2010-2014; Fairfax County, 2011; Montgomery County, 2008; Prince George's County, 2011; TPB, 2010a). Bicycle plans of the 1970s were often limited to specific corridors or were part of other planning documents, such as

comprehensive plans or transportation master plans. Bicycle plans typically called for the construction of on-street and off-street bikeways. Prince George's County's 1975 plan was an exception, since it focused on the construction of a shared-use trail network only.

There were only a few new pro-bike initiatives in the 1980s, such as the inclusion of bicycling in Arlington County's transportation master plan and the introduction of Alexandria's bicycle map. Similarly, the implementation of most of the initial plans from the 1970s was slow and mainly limited to the construction of off-street bike trails and paths or signage for bike routes without any dedicated infrastructure for cyclists. Progress in building bike lanes was very slow in Washington, DC—in spite of WABA's strong lobbying efforts and the city council's vote to increase pay for DC's bike coordinator and to hire two assistant bike coordinators.

In the 1990s, interest in bicycle planning reemerged at regional and local levels. Bicycling became part of the TPB's regional long-range transportation plan in 1991 and the TPB published its regional vision for bicycling in 1998 (TPB, 2001, 2006). Arlington County updated its transportation master plan with an expanded bicycling section in 1994 (Hanson & Young, 2008). Alexandria established a bicycle study committee in 1992 and published a bicycle transportation and multi-use trail master plan in 1998. Montgomery County adopted its Countywide Park Trails plan in 1998 and Prince George's County created a bicycle trails advisory group in 1998. Washington, DC however did not have a dedicated bike planner during the decade. The position had been abandoned in 1991 as part of city-wide cost cutting measures—even though the Federal government had paid 85% of the bike coordinators salary.

Building on the progress of the 1990s, bicycle planning experienced a renaissance in the 2000s. The TPB published its regional bicycle priorities plan in 2001 and authored and updated its regional bicycle plan in 2006 and 2010. Following WABA's lobbying and Mayor Anthony Williams' buy-in to promoting bicycling, Washington hired a full time bicycle planner in 2001 and released its bicycle master plan in 2005—including new off-street trails, a proposed network of 50 miles of bike lanes, more bike parking, and the mention of a possible bikesharing system. The District's decision to hire a bike coordinator and promote cycling was among others motivated by increased federal funding for cycling made available through federal transport legislation and a federal mandate that all U.S. states hire bike coordinators. Across the Potomac in Virginia, Arlington included bicycling in the goals and policies section of its transportation master plan in 2007. Alexandria hired its first bicycle planner in 2004, adopted a bicycle mobility plan in 2008, and updated its bicycle map in 2009. Montgomery and Prince George's Counties adopted bicycle master plans in 2005 and 2009, respectively. Fairfax County adopted a comprehensive bicycle initiative in 2006 and published a county bicycle map in 2009. As of 2010, all jurisdictions, MWCOG, and WMATA have staff dedicated to bicycle planning (TPB, 2010a).

### *Off-Street Paths and Shared-Use Trails*

Between the 1970s and 2000 most jurisdictions focused on building off-street trails and shared-use paths—often in collaboration with the National Park Service (NPS, 1990). In 2010, there were 490 miles of trails and shared use-paths connecting the entire region (TPB, 2010a). Trails in the DC region are typically shared between cyclists and other non-motorized users and are

either paved or made of compacted gravel. The late 1970s saw the opening of several trails such as Rock Creek Park trail in Washington, DC and regional trails, such as the Chesapeake and Ohio (C&O) towpath between Washington, DC and Cumberland, MD (1971), the Mount Vernon Trail connecting Arlington, Washington, DC, Alexandria, and Fairfax County (1973), and the Washington and Old Dominion (W&OD) trail connecting Arlington County, Fairfax County, and Loudon County, VA (1974) (NPS, 1990).

Today, roughly 190 miles of the regional shared-use trail network are entirely separated from roadways, often following old railway lines or canals, such as the W&OD trail or the Capital Crescent Trail between Georgetown in Washington, DC and Silver Spring in Montgomery County (NPS, 1990; TPB, 2010a). About 300 miles of trails run adjacent to roadways. For example, Arlington County's Custis Trail, which opened in 1982 and connects to both the Mount Vernon and W&OD trails, mainly follows the Interstate 66 corridor (Hanson & Young, 2008).

Compared to the 1970s and 1980s, new construction of regional trails has slowed since the year 2000, but new stretches of regional trails continue to be built (TPB, 2010a). For example, the City of Rockville in Montgomery County built 20 miles of trails between 1998 and 2005 (City of Rockville, 2011a). Similarly, between 2000 and 2010 Washington added 10 miles of trails to increase total trail mileage to 66 miles (ABW, 2014; DDOT, 2010-2014). While bike commuting on trails has been increasing, the majority of shared-use paths are most heavily used on weekends for recreation. For example, counts by the National Park Service indicate that 75 percent of bike trips on the Mount Vernon Trail are for recreation and only 25 percent are for transportation (NPS, 2011).

The region has also made progress in widening sidewalks and including bicycle and pedestrian facilities on new bridges to provide important connections for cyclists. For example, the rebuilt Woodrow Wilson Bridge crossing the Potomac River between Alexandria City and Prince George's County includes an improved shared-use bike path providing a safe connection for cyclists between the Mount Vernon Trail in Virginia and connecting routes in Maryland (TPB, 2010a). There are also shared-use sidewalks (some separated from traffic) on all but one of the bridges crossing the Potomac and Anacostia Rivers (DDOT, 2010-2014). Nevertheless, while the region has improved a number of important bridge connections, many shared-use paths on bridges remain narrow, crowded, and insufficiently separated from car traffic. This is especially the case for the older bridges crossing the Anacostia River.

### *On-Street Bike Lanes and Innovative Bike Infrastructure*

In contrast to the expansion of trails, few bike lanes had been built by the late 1990s. For example, Arlington County had only 3 miles of bike lanes in 1995 (Bike Arlington, 2011; TPB, 2010a). In 2001 Washington had only 3.2 miles of bike lanes, even though the city's 1978 plan had called for 17 miles of on-street lanes—which had not been built (DDOT, 2010-2014). Since then local jurisdictions have significantly expanded their supply of on-road bike lanes. Table 3.3 compares the supply of on-street bikeways and paved off-street trails for the year 2013. Bike lane supply ranged from 74 miles in Montgomery County and 66 miles in Washington, DC to only 5 miles in Prince George's County. Montgomery County had 278 miles of paved off-street trails compared to only 21 miles in Alexandria.

The comparison of total miles of bike paths and lanes hides variability in geographic size and population of the jurisdictions. Adjusting for land-area, the core jurisdictions have the greatest supply of bike lanes and paths (see columns 5 and 6 in Table 3.3). Alexandria, Arlington, and Washington, DC have been building bike lanes at a much faster rate than surrounding jurisdictions. For example, bike lane supply in Washington, DC increased 22-fold from 3 miles in 2001 to 66 miles in 2013. Similarly, bike lane supply in Arlington increased more than ten-fold from 3 miles in 1995 to 34 miles in 2013. Many of the bike lanes were installed on roadways that previously had extra wide car travel lanes or parking lanes with excess width. One example of this was 15<sup>th</sup> Street NW in Washington, DC, which had relatively low car traffic volumes. Moreover, local jurisdictions typically ‘installed’ on-street bike facilities during regular repaving of roadways, thus greatly reducing the cost of building bikeways—often as low as the extra cost of restriping the roadway.

Jurisdiction	On-Street Lanes, incl. Cycletracks (miles)	Paved Off-Street Trails (miles)	Total Lanes and Trails (miles)	Total Lanes and Trails per Land Area (miles / sq. miles)	Total Lanes and Trails per population (miles / 100,000 residents)
Washington, DC	66	62	124	2.02	21
Arlington County	34	50	83	3.21	40
Alexandria City	9	21	30	1.99	21
Fairfax County	25	200	225	0.57	21
Montgomery County	74	278	352	0.71	36
Prince George's County	5	85	91	0.19	11

**Table 3.3 Supply of bike lanes and paved off-street paths and trails, 2013** (*measured as centerline miles*) Source: Data collected directly from bicycle planners in each jurisdiction

The core jurisdictions have also led the region in experimenting with innovative bicycle infrastructure measures. For example, Washington, DC has installed bike boxes at several intersections since 2010. Bike boxes give bicycles an advanced stop line in front of automobiles, increase cyclist visibility for motorists, facilitate cyclist turning movements, and allow cyclists to pass-by traffic congestion and avoid tailpipe emissions. In 2013, Arlington began construction of two bike boulevards, traffic-calmed residential streets prioritizing bike travel, to provide safe alternative routes parallel to Columbia Pike, a major thoroughfare in the area (Arlington County, 2014).

Washington, DC also installed the region’s first bicycle activated traffic light at the intersection of 16<sup>th</sup> Street NW, U Street NW, and New Hampshire Avenue NW. Moreover, Washington, DC was the first in the region to install contra-flow bicycle lanes. The lanes run along 15<sup>th</sup> Street NW, New Hampshire Avenue NW, and G and I Streets NE, restricting car traffic to one direction but allowing cyclists to ride in either direction (DDOT, 2014c). Washington also built bi-directional bike lanes in the median on the portion of Pennsylvania Avenue, NW that runs between the U.S. Capitol and the White House. Special striping on the roadway provides a 10 inch buffer between cyclists and car traffic. There are also protected cycletracks on South Dakota Avenue NW, 15<sup>th</sup> Street NW, 1<sup>st</sup> Street NE, L Street NW, and M Street NW in Washington, DC. In contrast to buffered bike lanes, cycletracks provide additional vertical physical barriers to protect cyclists from car traffic. These physical barriers have typically been flexible plastic bollards, but in early 2014 concrete curbs were installed for the 1<sup>st</sup> Street NE cycletrack and a

short section of the M Street NW cycletrack (DDOT, 2010-2014).

Most area jurisdictions have marked road surfaces on several streets with ‘sharrows’—featuring two chevrons and a drawing of a bicyclist—reminding car drivers to share the road with cyclists. All jurisdictions have expanded their network of signed bike routes. These bike routes sometimes overlap with bike lanes and paths, but typically guide cyclists on ‘sharrowed’ roads and streets with low car traffic volumes. In 2014, Washington, DC had 98 miles of signed bike routes. Bike route signs and ‘sharrows’ do not require extra space on roadways and are easier to implement than separate bike paths and lanes that require dedicated space for cyclists. However, signed routes do not separate cyclists from car traffic and thus may discourage more risk-averse groups from cycling. This is especially relevant and may be particularly problematic given the region’s relatively rare use of traffic calming measures.

Indeed, in other North American cities, such as Vancouver and Portland, traffic calming is an integral part of the bike network (City of Portland, 2010; City of Vancouver, 2010; Pucher & Buehler, 2008; Pucher, Buehler, & Seinen, 2011). Traffic calming combines low speed limits with physical alterations of the road surface designed to slow or divert car traffic. Measures include speed bumps, humps, chicanes, median islands, raised crosswalks, curb extensions, street closures, and special pavement. Low speed limits and limited car traffic allow cyclists and motorists to share the road. Traffic-calmed neighborhood streets can often provide crucial connections between otherwise disjointed bike paths or lanes.

### *Spatial Distribution of Bikeways*

Figure 3.2 compares the spatial distribution of the construction of new bike lanes in Washington, DC between the early 2000s and 2012. The map shows that in the last decade, the District Department of Transportation (DDOT) focused its new bikeways in or near the city’s central business district (CBD), which stretches from 23<sup>rd</sup> Street NW to 2<sup>nd</sup> Street NE and D Street SW/SE to Massachusetts Avenue NW (DDOT, 2014a). Neighborhoods with the greatest increase in bikeways include Capitol Hill, Columbia Heights, Shaw, and Logan Circle. These neighborhoods already had some of the city’s highest cycling levels in the early 2000s and as the network of bike lanes has expanded in these neighborhoods, cycling commute levels have increased as well. Causation may run both ways, however. High levels of cycling in the early 2000s may have increased demand for bike lanes in these neighborhoods. More bike lanes in turn likely encouraged more commuters to ride their bicycles. As of summer 2014, the draft of DDOT’s Multimodal Long Range Transportation Plan announced an ambitious goal to build bike lanes and cycle tracks throughout the city reaching neighborhoods farther from downtown—including Georgetown and east of the Anacostia River (DDOT, 2014b).

DDOT’s spatial strategy for developing the city’s bike network appears to begin with connecting the CBD with neighborhoods in bikeable distance. With continued expansion, the bike network will eventually reach neighborhoods farther away from the main employment center. In the meantime, bike commuters from those outlying neighborhoods will likely pass through the bike facilities already built closer to the CBD. However, the construction of bicycle lanes in neighborhoods close to the CBD has not been uncontroversial. In neighborhoods close to the CBD public opinion associates bike lanes and cyclists with redevelopment, rising property

values, and economic pressure on poorer and mainly African American households. Indeed, in the 2000s neighborhoods like Capitol Hill, Columbia Heights, Shaw, and Logan Circle experienced gentrification and redevelopment with an influx of many young white professionals who seem to be more likely to ride bicycles (Urban Institute, 2015). Additionally, critics point to the relative lack of bike lanes in the more distant neighborhoods, especially east of the Anacostia River, as evidence of the District Government's neglect of predominately African American neighborhoods.

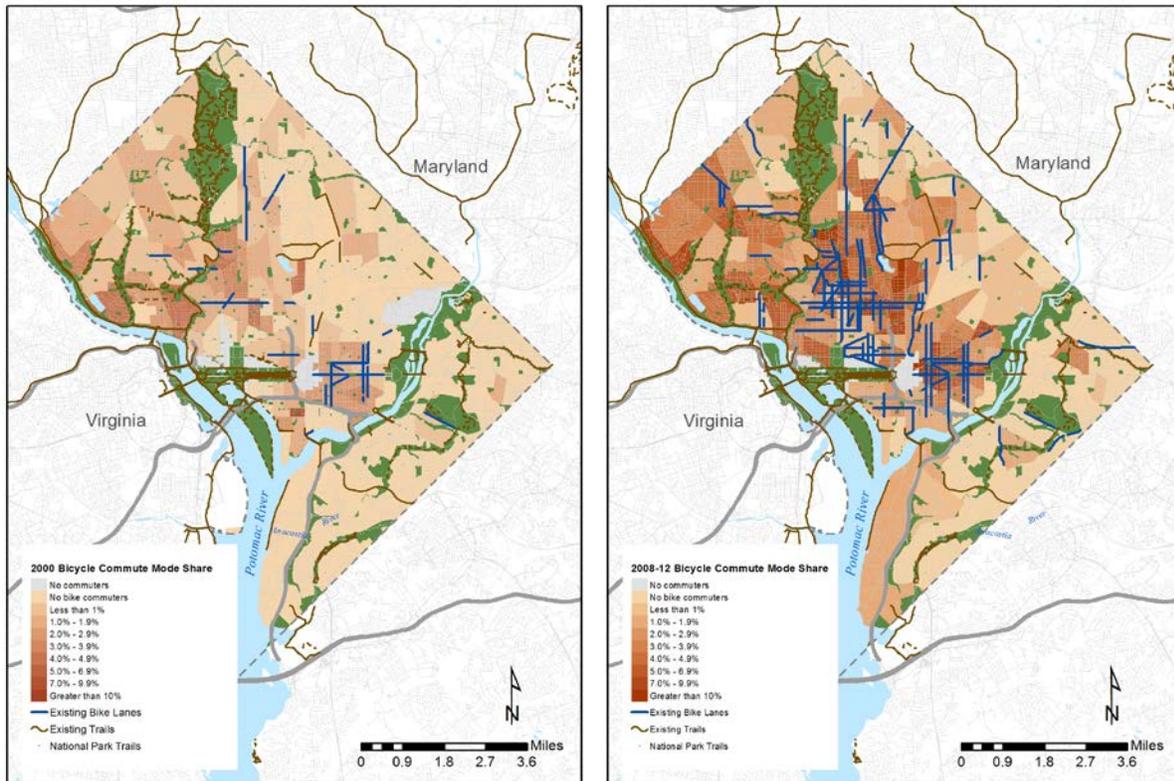
There has not been much research into the connection of cycling levels, bikeways, redevelopment, property values, and displacement. A handful of peer-reviewed academic publications, relying on qualitative research methods such as ethnographies and interviews, investigate the connection of gentrification with cycling and bike infrastructure in U.S. cities—including Washington, DC (Gibson, 2013; Hoffmann & Lugo, 2014; Hyra, 2014). They report that communities and developers both perceive cycling and bikeways to be connected with redevelopment, property values, and displacement. However, no study has empirically linked cycling and gentrification using quantitative data on cycling levels, bikeway supply, and indicators for gentrification.

Indeed, some of the fastest changing neighborhoods in Washington, DC have been among the areas that saw a significant increase in bikeway supply and cycling levels. However, quantitative data suggests that bikeways and cyclists are unlikely to be the root cause of gentrification in those neighborhoods. The low prevalence of cycling in the city's population and among newcomers suggests that cyclists are a minority among both old and new residents. A study presented to the National Neighborhood Indicators Partnership (Dann, 2014) analyzed the likelihood for newcomers, who moved into one of the largest 70 U.S. cities in the last year, to commute by bicycle using 2007-2011 ACS PUMS data. The study found that in the 70 largest U.S. cities 1.7 percent of newcomers cycled to work, compared to 0.9 percent of existing residents. For Washington, DC the study extrapolates a 3.1 percent bike commuter share for newcomers in 2007-2011, compared to 2.5 percent for existing residents. However, the difference between existing residents and newcomers is not statistically significant at the 90 percent level (Dann, 2014). In any case, this indicates that 97 percent of newcomers did not cycle to work. This is also reflected in census tract commute data: in almost all census tracts in DC more than 95 percent of commuters do not regularly cycle to work. The low prevalence of cycle commuting among newcomers suggests that neither cyclists nor the bikeway supply could be a primary cause of redevelopment, increasing property values, or displacement in areas close to Washington, DC's CBD.

A review of the literature yielded no rigorous academic peer-reviewed study empirically demonstrating a positive quantitative relationship between on-street bike lanes and property values adjacent to the lanes after controlling for other factors known to determine property values. In fact a hedonic pricing study from Minneapolis found *lower* property values for homes closer to on-street bike lanes (K. J. Krizek, 2006). Several studies found a positive relationship between the presence of off-street bicycle paths—typically in parks or along rivers—and property values of adjacent homes (K. J. Krizek, 2006; Lindsey & Nguyen, 2004). Thus, most existing research does not support the idea that restriping the roadway surface to accommodate cyclists could be the root cause for the spikes in property values seen in the some neighborhoods

in Washington, DC over the last 20 years. However, an internet search of non-academic popular press news outlets reveals a large number of realtor companies and homeowners claiming that bike lanes boost property values and business sales. It may be that bicycling and bikeway supply are correlated with gentrifying neighborhoods and increasing property values through distance to the CBD. New residents moving into DC may be choosing lower-income, minority neighborhoods that are close to the city center, and therefore most conducive to making short trips by bicycle.

Rededicating roadway lanes and parking space from use for cars to bikeways has also been controversial. During the 20<sup>th</sup> century the automobile has gained full reign over streets in the U.S.—removing trolley tracks and most cyclists from roadways as well as relegating pedestrians to sidewalks and dedicated crosswalks (Norton, 2008). Additionally, most American drivers are used to parking their cars along streets, often for free (Shoup, 2005). Installing new bicycle infrastructure requires space on roadways that has previously been dedicated to the automobile. DDOT initially installed bikeways along roadways where car traffic counts indicated unused roadway capacity. But growing the bikeway network has meant reducing car travel or parking lanes, sometimes leading to political resistance. For example, construction of the M Street cycle track was delayed by a dispute over on-street parking outside the prominent, historically black Metropolitan African Methodist Episcopal Church (DeBonis, 2013). The church objected to the removal of on-street car parking due to the cycletrack's physical barrier intended to protect cyclists from car traffic. This barrier would have limited on-street car parking during church services. As a compromise DDOT installed an unprotected bike lane on that city block, preserving on-street car parking spaces for the church. Similar conflicts about space can be found in cities throughout the country and the Washington, DC region, such as along Alexandria City's King Street, where wealthy—mainly White—residents opposed bike lanes due to a loss of free on-street car parking (Sullivan, 2014).



**Figure 3.2 Supply of bike lanes and paths and cycling commute levels in Washington, DC, early 2000-2003 (left) and 2008-2012 (right).** (USDOC, 1980-2000, 2014) *Source: Map created by John Stowe*

### *Bike-Transit Integration, Bike Sharing, and Bike Parking in Buildings*

Integrating bicycles with public transportation may be mutually beneficial for both modes (Brons, Givoni, & Rietveld, 2009; Martens, 2007). Bike parking at transit stops and dedicated space for bikes on trains and buses can enlarge the catchment area of public transport beyond typical walking distances. Cyclists can ride their bikes to and from transit stops and make longer trips than would be otherwise possible just by bike. Public transport also provides an alternative when regular cyclists experience inclement weather or mechanical failure. Daily Metrorail access trips by bike during the morning peak increased from 965 in 2002 to 2,384 in 2012, though the bike share of access trips remained low at 1 percent in 2012 (WMATA, 2010-2012). The busiest stations in the region for bike access were Union Station in Washington, DC, Hyattsville in Maryland, and Pentagon City and East Falls Church in Virginia (NVTC, 2011). Statistics about bikes on buses were only available from Metrobus. Of the roughly 400,000 daily passenger trips on Metrobus, approximately 650 (0.2 percent) were made by passengers with bicycles (WMATA, 2010-2012).

With the exception of the Prince George's County's bus system, all buses had front-mounted bike racks with space for up to two bicycles in 2013 (News, 2013; WABA, 2010). Transit systems do not charge for transporting bikes on bus racks. Cyclists can also bring their bikes on Metrorail for free, but only four bicycles are allowed per car and only outside of peak commute

hours (weekdays from 7-10am and 4-7pm). All Metrorail stations are equipped with elevators and cyclists are required to use elevators, since bikes are not allowed on escalators (WABA, 2010). Maryland's MARC commuter rail, serving the northern suburbs, does not allow any full-size bikes on its weekday commuter trains. VRE, Virginia's regional rail system, allows bicycles on midday trains, but bans bikes from morning inbound and afternoon outbound trains. MARC, VRE, and Metro allow folding bicycles on their trains at all times (WABA, 2010).

There are about 1,900 bike rack spaces and 1,300 bike lockers available at transit stations and park-and-ride lots in the Washington region (NVTC, 2011; WABA, 2010; WMATA, 2010-2012). Spaces in bike racks are available on a first-come, first-serve basis and are free of charge. Lockers protect bicycles from weather and theft and can be rented on a yearly basis.

In 2009, Washington's first full service bike station opened next to Union Station. The bike station provides indoor, secure parking spaces for 140 bikes. Cyclists can park their bikes for \$1 per day, \$12 per month, or \$96 per year (NVTC, 2011; WABA, 2010). The station also offers bike repair, bike lockers, and changing rooms, but does not provide showers. Station staff are present from 7 am to 7 pm on weekdays and from 9 am to 5 pm on weekends, and bike station members can access the station with a key card at any time (DDOT, 2010).

### *Bike Sharing*

Washington, DC was the first area in North America to experiment with third-generation bike sharing systems—consisting of bicycles, docking stations, and computerized kiosks for self-service bike rental with credit or debit cards (CaBi, 2014; DeMaio, 2009; Shaheen, Guzman, & Zhang, 2010). In 2008, SmartBike opened a small pilot project with 120 bikes and 10 kiosks in Washington DC (SmartBike DC, 2010). In September 2010, SmartBike was replaced with Capital Bikeshare (CaBi). CaBi is the first regional bikesharing system in North America. It is jointly operated by Arlington County, Alexandria, Montgomery County, and Washington, DC. CaBi is considerably larger than SmartBike, with 2,600 bikes and 334 stations in 2014.

CaBi has been expanding steadily since its launch in 2010. The initial phase of 100 stations was installed by February 2011. Washington, DC announced plans that fall to add 32 new stations in 2011 and 50 in 2012, as well as plans to expand some high-volume stations (CaBi, 2014). Arlington began expanding in 2011 as well, and both Washington, DC and Arlington have continued to fill in their networks. Alexandria joined in September 2012 with eight stations and expanded to 16 stations in 2014, and Montgomery County joined in May 2013 with 45 stations in place by early 2014 (CaBi, 2014; City of Alexandria, 2011b; City of Rockville, 2011b). The bankruptcy of Bixi, CaBi's equipment supplier, delayed further expansion for several months in 2014, including infill stations in existing jurisdictions and the planned addition of College Park, MD (Lazo, 2014), but expansion eventually resumed.

Funding for Washington, DC's share of CaBi (\$6 million) came from federal Congestion Mitigation and Air Quality (CMAQ) funds and a 20 percent local match. Arlington County's funds (\$835,000) originated from the Virginia Department of Transportation and other local monies (DDOT, 2010-2014). Similar to Washington, the City of Alexandria used CMAQ funds to pay for the installation of CaBi (City of Alexandria, 2011b). Montgomery County was able to

obtain Job Access Reverse Commute (JARC) funds from the Federal Transit Administration (City of Rockville, 2011b). Due to JARC requirements the county distributes free CaBi memberships to qualifying low-income residents.

CaBi's 17,000 members made over 1 million trips in the first year of operation, between September 2010 and September 2011 (CaBi, 2014). By its third anniversary in 2013, CaBi had over 23,000 members and 5 million trips; the system had reached 6 million trips by February 2014. The greatest challenge for the system is balancing bicycles between stations during the morning and afternoon commutes. In the morning, demand for bikes is highest in residential neighborhoods, while demand for bike parking is greatest in downtown locations. Commuter movements from residential neighborhoods to workplaces downtown in the morning result in 'empty' kiosks without bikes in residential neighborhoods and 'full' kiosks without available bike parking spaces in downtown. Bicycle theft and vandalism have been minimal. The system sees about seven cases of vandalism and one missing bike every month; about two thirds of missing bikes are later recovered. Bike theft may be minimal because the design of CaBi bikes is unique and bikes are built with special parts that cannot be used on other bikes and need special tools to be disassembled (CaBi, 2014).

In the District of Columbia the highest density of CaBi stations is in the downtown area in Wards 2, 6, and 1 with 5.4, 3.5, and 1.7 docking stations per 10,000 residents. The more outlying wards 4, 8, 3, and 7 have a lower density of CaBi stations (0.5, 0.6, 0.9, and 1.0 stations per 10,000 residents). This distribution of CaBi stations is in line with the main usage of CaBi either for short trips or commute trips to work.

There is no statistical representative survey based on a random sample of CaBi members. Analysis of a (non-representative) sample of respondents to CaBi's 2011 member survey shows that the majority were male (55 percent), car owners (52 percent), White (81percent), and younger than 34 years old (66 percent) (CaBi, 2012). Thus compared to statistics of typical cyclists in the area presented above CaBi members were younger, less likely to own a car, and more likely female. However, both CaBi member survey respondents and area cyclists were predominately White (>80%). African Americans only accounted for 3.0-9.0 percent of area cyclists and 3.5 percent of respondents to the 2011 CaBi membership survey.

#### *Bike Parking in Buildings and Public Spaces*

Parking for bicycles at trip origins and destinations is as important for cyclists as car parking is for drivers. Ordinances in all jurisdictions require some form of bicycle parking—typically depending on office space or retail floor area, number of units in residential buildings, or number of car parking spaces provided. Arlington County and Montgomery County additionally require showers and changing facilities for bicyclists in buildings larger than 50,000 and 100,000 square feet respectively (MWCOCG, 2011). Washington, DC mandates bicycle parking in off-street car parking garages (DDOT, 2010-2014). Prince George's County's bike parking requirements are limited to special transit-oriented developments in the county. In Fairfax County commercial developments may be required to provide bike parking and showers when requesting a variance or special use permit.

Area jurisdictions do not systematically track the number of bike parking spaces. Washington estimates that in 2011, about 2/3 of car parking garages in the city provided bike parking (DDOT, 2010-2014). Arlington County estimates that 4,000 to 6,000 secure bike parking spaces

have been built since requiring bike parking in 1990 (Bike Arlington, 2011). Some data is available on the number of bike racks supplied in public spaces, such as on sidewalks or in public squares. Between 2002 and 2009, Washington, DC installed 1,162 bike racks. Arlington County provides 600 public short-term bicycle racks, including a covered bike parking shelter at the Shirlington Transit Center. Arlington plans to install 50-70 new bicycle racks per year. Alexandria has been installing about 100 new bicycle parking spaces each year, including a number of on-street “bike corrals” that convert a car parking space into dedicated bike parking surrounded by bollards (City of Alexandria, 2011a). Washington, Arlington, Alexandria, and Montgomery County have a bicycle rack request program that allows businesses and citizen to request bike rack installation. DDOT pays for bicycle racks if employers cover the cost of installation.

### **Promotion, Information, Incentives, Advocacy, and Education**

There are many bike promotion events and educational programs in the Washington region. Some programs are provided regionally while others are local initiatives. The following briefly summarizes several key efforts to increase cycling and improve its safety for all groups. The programs generally promote cycling and safety for all groups, such as Safe Routes to School for example. In addition this section also highlights a few programs that are targeted specifically at increasing cycling among minorities (WABA, 2010-2014).

#### *Cyclist Education*

Similar to other regions in North America, the Washington, DC region offers bike education courses for adults and children. The Washington Area Bicyclist Association’s (WABA) Confident City Cycling course provides a refresher in riding skills for interested adults. Arlington also offers classes for adults in Spanish. Together with local and state governments WABA also provides cycling courses for children. Washington, DC’s week-long Street Smarts for Kids program offers cycling classes which focus on cycling safety for children in grades 3 through 5. DDOT estimates that in 2009 and 2010 an average of 4,000 children participated in youth bicycle education courses (Alliance for Biking and Walking, 2010).

Rockville, MD was the first city in Maryland to develop and implement a comprehensive K-5 grade pedestrian and bicycle safety education program for children. In 2011, Fairfax County’s first Braddock Bike Day safety event provided cycling education and bike rodeos for 75 participants. Moreover, in collaboration with WABA, local jurisdictions participate in the federally funded Safe Route to Schools (SRTS) program—offering financial and planning support for schools that wish to improve safety for walking and cycling to school. In the summer of 2013, the Virginia DOT hired Toole Design Group as a consultant to run its SRTS Program resulting in coordinators being hired in Arlington and Fairfax for the first time and continued funding in Alexandria, which already had a coordinator. However, recent changes under the latest federal transportation bill, MAP-21, have weakened SRTS funding, putting some of these programs at risk.

### *Driver Education and Enforcement*

Educating motorists and enforcing the rules of the road are important to increasing cyclist safety. Driver training in all jurisdictions includes information about non-motorized road users. Additionally, DDOT conducted training for 2,000 bus drivers on how to protect cyclists. Since 2005, Washington, DC has also trained 400 of its police officers in pedestrian and bicyclist issues—alerting police officers to the specific needs of pedestrians and cyclists (DDOT, 2005, 2010-2014). Public pressure has led to specific enforcement campaigns, most notably an effort to reduce U-turns across the bike lanes in the median of Pennsylvania Avenue (DDOT, 2010-2014).

Since 2002, the TPB has coordinated the annual Street Smart program, including a public awareness campaign about road safety with advertisements at transit stops, on the radio, and in the print media. The program is geared to foster behavioral change and intends to improve safety for cyclists and pedestrians. The campaign also includes a temporary surge in traffic safety enforcement with increased citations and warnings for motorists, pedestrians, and cyclists. During the fall of 2012 and the spring of 2013, police issued 3,804 citations and 483 warnings to motorists, pedestrians, and cyclists (Street Smart, 2014).

### *Bike Promotion*

All jurisdictions participate in the national Bike to Work day. Between 2002 and 2013, the number of participating cyclists in the 6 jurisdictions increased sevenfold from 2,035 in 2002 to 14,673 in 2013 (WABA, 2010-2014, 2011). There are other annual bike ride events, such as Bike DC; the annual 50 States and 13 Colonies Ride; and the Vasa Ride in March organized by WABA and the Swedish Embassy. More frequent bike events include the City Bikes Ladies rides on Sundays, organized by City Bikes, and Critical Mass rides on the first Friday of every month. ‘Kidical Mass’ is also spreading across the region, with casual family bike rides regularly held in Washington, DC, Arlington, and most recently Alexandria and Rockville. There are also regular bike clinics and co-ops in many jurisdictions—such as Phoenix Bikes in Arlington, VéloCity in Alexandria, and the Bike House in Washington, DC. These organizations hold community events and other educational opportunities for youth as well as adults to learn about bicycling and bicycle repair. Bike clinics and co-ops also provide a venue for cyclists to interact and share experiences. Such as BicycleSpace, a new bicycle shop, which organizes group rides and other events for cyclists. Additionally, in 2013 Washington, DC became one of about 10 cities across the country selected to host a Tour de Fat festival, organized by New Belgium Brewery to benefit local bicycle nonprofits. The ArtCrank traveling bicycle poster show will come to the region for the first time in 2014 as well.

WABA’s Bicycle Ambassadors attend public events and engage in one on one consultation about cycling and cyclist safety. The City of Alexandria, WABA, and the National Park Service also partnered to sponsor a similar ambassador program to promote non-automobile travel in Alexandria. At some large events, such as the Cherry Blossom festival in Washington in the spring, WABA volunteers provide valet parking for bikes. There is no charge for cyclists, but event organizers pay a fee to WABA. When using the bike valet parking, cyclists leave their bikes at a guarded WABA stand, receive a uniquely numbered claim ticket for their bicycle, and later reclaim their bikes using their ticket.

In 2010, WABA launched its East of the River program in Wards 7 and 8 to better serve neighborhoods it perceived as “historically disconnected from the infrastructure and community needed to support biking” (WABA, 2014). The program seeks to improve biking infrastructure, especially bridge crossings, provide bicycle education classes, and ensure bicycling is accommodated in future developments. Additionally, Black Women Bike DC launched in 2011 with a mission to “build community and interest in biking among Black women in the District through education, advocacy, and recreation” (Black Women Bike, 2014). The organization holds bike rides every third Saturday of the month—in varying locations. Moreover, the group offers workshops and guides on cycling, such as a ‘bike buying guide’ or ‘cycling in winter’ or ‘how to cycle safely’ workshops (Black Women Bike, 2014).

#### *Information and Incentives for Cyclists*

All jurisdictions provide bicycle maps in print and online. Arlington distributes 60,000 maps per year (Bike Arlington, 2013). Maryland and Virginia also provide statewide maps of facilities for bicyclists. Google Maps and Ride the City provide online bicycle trip planning tools that allow cyclists to find the best route between trip origins and destinations. Ride the City allows cyclists to distinguish between the safest route, following bike lanes and paths as closely as possible, and the most direct route for those cyclists who are comfortable cycling in traffic. Cyclists can also access Google Maps and Ride the City on their smart phones while en route. Several other apps provide additional features for cyclists. Spotcycle reports the availability of CaBi bikes and docks nearby; RideScout provides directions for making a trip by biking, transit, driving, taxi, and CaBi, sorting by time and cost; and Nimble DC provides trip routing using a combination of transit and CaBi or a personal bike.

The MWCOG offers a guaranteed-ride-home program for workers who commute to work by bike, transit, or on foot at least two days per week (MWCOG, 2011). Once signed up, the program guarantees up to four free rides home per year in case of emergency. The program intends to remove the uncertainty and increase flexibility for non-automobile commuters. The MWCOG’s Commuter Connections program also provides detailed information about bike commuting for individuals and employers. Information for employers comprises local initiatives, as well as federal programs, such as the pre-tax parking cash-out and the \$20 bicycle transportation fringe benefit. In the 2012-13 school year, Commuter Connections launched SchoolPool (Commuter Connections, 2014), a spinoff of their ride-matching program, helping to connect families wishing to bike, walk or carpool to school.

In 2011, the Fairfax County Department of Transportation offered a Bike Benefit Match Program to employers who provided the \$20 federal bicycle transportation fringe benefit (Fairfax County, 2011). For qualified employers, the county matched 50 percent of the total amount in fringe benefits. Matching funds could be used by employers to purchase bike racks, lockers, or marketing materials. Arlington County offers an innovative incentive for its employees to cycle to work (Bike Arlington, 2011). County employees who cycle for at least half of their commutes receive \$35 per month. Moreover, Arlington’s car-free-diet program offers online resources for commuters to compare differences in costs as well as emissions between commuting by car and bike. Individuals can also make an online pledge to drive less and cycle more.

#### *Advisory Committees*

Washington, DC has a Bicycle Advisory Council that meets bi-monthly and is appointed by the DC City Council to advise the District government on bicycling issues. Arlington County has a Bicycle Advisory Committee that meets once a month and is appointed by the County Manager to focus attention and resources on bicycling. Alexandria has a Bicycle and Pedestrian Advisory Committee that is a voluntary forum for citizen input in bicycle planning and programming and meets on a monthly basis. Additionally, the Fairfax Advocates for Better Bicycling work with Fairfax County staff on projects such as the Bicycle Master Plan, bicycle safety and police outreach, and Safe Routes to School programs. Montgomery Bicycle Advocates work to support Montgomery County efforts to improve facilities and programs for bicyclists. Prince George's County has a Bicycle and Trails Advisory Group that is chaired and organized by the Transportation Planning Section of the Planning Department and meets quarterly to facilitate discussion between local implementing agencies and citizens interested in bicycle and pedestrian issues. Finally, MWCOG has a Bicycle and Pedestrian Subcommittee that provides advice and assistance to the Technical Committee, evaluates the Regional Bicycle and Pedestrian Plan, advises long range transportation planning, oversees the regional Street Smart Pedestrian and Bicycle Safety Campaign, and facilitates technology transfer and information sharing across jurisdictions and state programs.

#### *Legal advocacy*

In addition to direct outreach to individuals and campaigns for improved infrastructure, local advocates have also argued for changes to laws concerning bicyclists. While many of these are directly related to safety, such as safe passing distances, others address aspects of law enforcement and the legal system that have had disproportionate or discriminatory outcomes. The most contentious of these involved Washington, DC's mandatory bicycle registration law, with years of complaints culminating in an investigation by the Police Complaints Board which found that the law had been "used as a retaliatory and pretextual search tool against [minorities and] other unpopular groups." (Police Complaints Board, 2005) The registration law was repealed in 2008. More recently, WABA has pushed for changes to the legal structure governing recovery of damages from accidents: Washington, DC, Maryland and Virginia are some of the last remaining American jurisdictions to apply the "contributory negligence" standard. WABA argues that, combined with routine misapplication of bicycle laws by investigating officers, this legal environment creates an impossibly high bar against recovery for injured cyclists, especially those without the resources to hire an attorney (Billing, 2014). DC council members introduced bills proposing changes to Washington, DC's contributory negligence law in 2014 and 2015.

#### **Summary and Policy Recommendations**

Between 1990 and 2008-2012, bicycling has increased in the Washington region. The number of regular bike commuters nearly tripled during this time period. In spite of the increase, in 2008-2012 cycling only accounted for 0.6 percent of commutes in the Washington, DC region. In 2008-2012 the urban core jurisdictions of Washington, DC (3.2 percent), Arlington (1.2 percent), and Alexandria (1.0 percent) had higher cycling levels than the region and suburban areas. However, even within the urban core cycling was spatially concentrated in certain neighborhoods, such as Capitol Hill, Adams Morgan, and Mount Pleasant in Washington, DC, and the Rosslyn-Ballston Corridor and Old Town Alexandria in Virginia. In only a few bicycle-oriented neighborhoods in Washington, DC bicycling accounted for more than 5 percent of regular commuters.

Modern bike planning in the Washington, DC region has its roots in the 1970s with plans to build on-street bike lanes and off-street bike paths. The region's initial focus had been on building off-street shared use paths. In 2014, 490 miles of shared-use paths connected the entire region. Until the late 1990s, bike infrastructure supply was mostly limited to shared-use off-street bike paths and very few on-street bike lanes had been built. Since the late 1990s, all jurisdictions have expanded their networks of on-street bike lanes and signed bike routes. Washington, Arlington, and Alexandria have expanded their network of on-street lanes more aggressively than suburban Montgomery, Fairfax, and Prince George's counties. Washington, DC has also been the regional leader in experimenting with innovative bicycle infrastructure, such as traffic lights for cyclists, bike boxes, contra-flow bike lanes, cycletracks, and a state of the art bike parking station at Union Station. Together with Arlington County, Washington, DC launched the nation's first regional bike sharing program.

In spite of the progress documented above, many challenges for cycling remain. For example, data suggests that area cyclists are still predominantly male, between 25 and 65 years old, White, and from higher income groups. Programs tailored to specific groups could help increase cycling for everyone in Washington, DC. Some efforts are already underway. All jurisdictions are extending their network of bicycle facilities, which will make cycling more convenient, less stressful, and will extend cycling's appeal to more risk averse groups. Even though the supply of bike lanes has increased significantly over the last decade, the bike network still remains fragmented and often requires cyclists to ride in roads with heavy car traffic. Further expansion of the bike lane network will require narrowing or removing travel lanes or parking from cars, which will be less politically acceptable than many of the easier measures implemented so far. Moreover, area-wide traffic-calming of residential neighborhood streets should be part of this package to enable cyclists to share roads with slow traveling cars. Cities like Portland, Seattle, and Vancouver have created bike boulevards—traffic-calmed residential streets that prioritize cycling over car travel.

More research is needed into the racial/ethnic discrepancy in cycling levels and the potential connection of bikeways, increasing property values, and neighborhood change in Washington, DC. Existing data on the breakdown of cyclists in Washington, DC by various demographic groups suffers from small sample sizes, but suggests significantly lower cycling levels among African Americans. At the national level the National Household Travel Survey suggests no difference in cycling rates—1.0% of trips—among both African Americans and Whites, while the U.S. Census Bureau reports a 0.3 percentage point difference in bike commute rates between African Americans and Whites (0.3% vs. 0.6%). Some scholars, realtors, and public commentators connect bicycling and bikeways to the displacement of poorer mainly African American residents in inner city neighborhoods. However, existing data points to such a small prevalence of cycling among both newcomers and long-time residents in inner city neighborhoods that it is unlikely cycling or cycling infrastructure is a significant cause of displacement. Moreover, quantitative peer-reviewed studies do not confirm a relationship between bike lanes and property values—when controlling for other variables. A more likely explanation is that bicycling and bikeway supply are correlated with changing neighborhoods and increasing property values through distance to the CBD. New residents moving into DC choose neighborhoods close to the city center, and these neighborhoods are within bicycling distance from the CBD. However, more research and better data are needed to answer this

question.

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ENDNOTES:

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<sup>1</sup> *The authors would like to thank the Virginia Tech's Institute for Society, Culture and Environment for supporting this research. This research builds upon a two year research project funded by the United States Department of Transportation, Research and Innovative Technology Administration (RITA) via the Mid Atlantic University Transportation Center 'Determinants of Cycling in the Washington, DC Region'. Some of the content has been published in the journal World Transport Policy and Practice (WTPP) in 2012 and is used here with permission of the WTPP editor. Virginia Tech graduate assistants Andrea Hamre and Kyle Lukacs contributed information and data and provided review comments on earlier drafts.*

<sup>2</sup> *We are grateful to following individuals for their help in collecting data and identifying data sources: Charlie Strunk, Jeff Hermann, William (Zack) Fields, and Glen Hiner (Fairfax County); Fred Shaffer and Paul Curling (Prince George's County); Jim Sebastian, Mike Goodno, Heather Deutsch, Darren Buck, and Chris Holben (DDOT), Carrie Sanders, Yon Lambert, and Alex Gonski (City of Alexandria); Kristin Haldeman (WMATA); Clara Reschovsky and Robert Griffiths (MWCOCG); Greg Billing, Glen Harrison, Eric Gilliland, and Bruce Wright (WABA); Aruna Miller, Patricia Shepherd, and Gail Tait-Nouri (Montgomery County); Richard Viola, David Goodman, John Durham, David Patton, and David Kirschner (Arlington County); Thomas Sheffer and Tim Bevins (National Park Service); Bill Nesper, Darren Flusche, and Jeff Peel (League of American Bicyclists); as well as Peter Moe, Mark Hersey, Sandy Modell, Bruce Dwyer, Michael Jackson, Paul deMaio, and Elizabeth Wright.*