District of Columbia

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These indicators were derived from data produced by the U.S. Census Bureau and may differ from data produced by other entities.

Historical Census Tract Data for the District of Columbia: 1930 to 2015

By Travis Pate

The Office of Planning partnered with the Office of the Chief Technology Officer to make historical census data available to the public. This release will allow the public to view and download demographic, social, housing, and economic information for the District of Columbia. The data are presented by census tract geography for each decennial census from 1930 to 2010 and each American Community Survey (ACS) 5-Year Estimates from 2005-2009 to 2011-2015 (see side bar for explanation). With these data, the public can explore how the city's population shifted from concentrated density in central Washington to spreading to areas such as along Georgia Ave in the upper Northwest corridor and across the Anacostia river in Southeast. The availability of this information will allow for research into areas such as the commuting choices of District workers: an example is given in this report that demonstrates to what degree workers have chosen to use public transportation to get to work as the METRO system expanded over the past four decades. The data are accessible through Open Data DC as an interactive web map and are downloadable as a spreadsheet,

KML (Google Map format), or shapefile (for use in Geographical Information Systems software).

All data are available by Census tracts, a geography that is unique to the US Census Bureau. Although similar in size to neighborhoods, census tracts do not typically match neighborhood boundaries. However, they are still useful for exploring small area demographics since these tract data are the only real source of wide-ranging information (see table 1 for the list of data that are included in this release). It is important to note that the boundaries of census tracts change over the decades. The Census Bureau states that census tract boundaries are delineated with the intention of being maintained over a long period of time. However, due to increased development and population growth in areas, the US Census Bureau split census tracts into new tracts to capture the new growth. Census tracts are occasionally merged if population declines in an area. Table 2 shows how the number of census tracts in the District of Columbia have changed from 1930 to 2010. Current census tracts have an average of 4,000

people but can range from 1,200 and 8,000 people. However, the average number of people in census tracts and the maximum number of people in census tracts have changed dramatically over the decades (in 1950 the average was 8,356 and the maximum was 36,626).

DCGIS Open Data portal lists the historical census data by year (or time period in case of the ACS). The DCGIS Open Data tool presents the user with an interactive map of Census Tracts for the individual year the user selects. The user can zoom in and click on individual tracts to access the data that are presented in a popup table. Below the map, individual demographic indicators are presented alphabetically in the form of selectable cards. When the user clicks on a card (which is linked with a chart and map visualization) a popup appears showing a graph of the distribution of the data in columns and the map changes to a color scheme representing the spatial distribution of the data. There is also a data table view option for a user to view all the data from that year together. In the table view, the user has the option to sort and filter the data fields.

Decennial Census: The census of population and housing, taken by the Census Bureau in years ending in 0 (zero). Article I of the Constitution requires that a census be taken every ten years for the purpose of reapportioning the U.S. House of Representatives. *-U.S. Census Bureau*

Beginning in 1940, the census included a questionnaire that was sent to a sample of the population which allowed for the collection of a broader range of socioeconomic information.

The American Community Survey: The program whereby the Census Bureau captures socioeconomic data that had previously taken as a part of the sample questionnaire portion of the decennial Census. The ACS program started in 2005 and is conducted continuously with the results released annually.

Table 1: Checklist of Available Data: 1930-2015																
Data availability checklist	Decennial Census									American Community Survey						
	1930	1940	1950	1960	1970	1980	1990	2000	2010	2005-2009	2006-2010	2007-2011	2008-2012	2009-2013	2010-2014	2011-2015
Total Population	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Age groups	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Age - Under 18				✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Age - Over 60	✔			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Age - Over 65	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Sex	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Race	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Hispanic Origin				✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Foreign Born	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Total Housing Units		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Units in structure		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Total Households	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Household size		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Ave. Household size		✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Vacant Household		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Tenure		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Household Type			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Presence of - Under 18						✔		✔	✔	✔	✔	✔	✔	✔	✔	✔
Presence of - Over 65						✔		✔	✔	✔	✔	✔	✔	✔	✔	✔
Home Value		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Rent		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Group Quarters Population			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
School Enrollment			✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Educational Attainment		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Languages Spoken at Home						✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Employment Status		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Industry			✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Occupation		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Means of Travel to Work			✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Travel Time to Work				✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Disability Status				✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔
Veteran's Status					✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Vehicle Availability			✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Income Rangers			✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Median Income					✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Health Insurance Coverage													✔	✔	✔	✔
Poverty - All persons		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Poverty - Person under 18		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
Poverty - Families		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔

Source: IPUMS National Historical *Geographic Information System; Version 12.0* [Database]. Minneapolis: University of Minnesota 2017.

Custom Maps and Analysis

Open Data DC offers a "Create Webmap" link that opens the database in ArcGIS Online, which is a mapping tool that allows for the creation of custom maps. ArcGIS Online allows users to view the data with colorful symbology and create their own color schemes for demographic indicators. Users can print the map from their web browser. The information included in the database can be viewed as a single table as well. This web tool also allows users to conduct analysis through the ability to create custom data fields (such as combining data fields and calculating percentages). Some areas of analysis that might be of interest to explore are: high/low rates (such as homeownership and educational attainment) and hot spots (such as population density and poverty). The DCGIS open data site also allows users to download the database in a format suitable for Geographical Information Systems (GIS) software. GIS software allows users greater flexibility in creating maps and conducting more sophisticated analysis with spatial data. Some GIS software are available for free, such as QGIS. The ability to export the data as a KML allows the public to upload the census information into Google Maps. The ability to export the data as a spreadsheet allows for analysis within software programs such as Excel.

It is very important to keep in mind how census tracts themselves have changed over time (particularly the area that they cover) when considering how to conduct an analysis with these datasets since they are the basis of measurement.

The changing nature of census tract boundaries presents a challenge for long term study of small areas. Figure 1 is a map of population density over time, and it helps illustrate the changing patterns of growth as well as how census tracts have been split and merged in the District. The greatest number of census tracts the District has had was 192 in 1990. Population loss during the 2000s resulted in several census tracts being merged. The Census Bureau used the 2000 census tract boundaries as the geography for the 2005-2009 ACS and the 2010 census tract boundaries for the 2006-2010 ACS and later.

For the most part, census tracts have been split into smaller tracts to delineate new growth. This means that the new census tracts nest within the boundaries of the older tracts. Therefore, it is possible to make comparisons of the same geography over time, but a little work is involved to be sure of comparing all the newer tracts with the older tract area. As mentioned, few census tracts were merged during the 2000 and 2010 Census. This also presents a challenge to data users, but again the solution is to make sure one is using the nested tracts from the time prior to the merge in making comparisons to the newer, larger tract. Making the comparisons in both cases is likely easiest with GIS software, where the user can download the shapefiles from different time periods and layer them other to see how new and old census tract boundaries line up.

An example of an analysis described above would be if one decided to compare the area of Ward 8 from 1930 to 2011-2015. If the current Ward 8 boundaries were used, one could determine the population

Table 2: Number of Census Tracts by Decade	
Census Year	**Number of Tracts**
1930	95
1940	96
1950	96
1960	125
1970	150
1980	182
1990	192
2000	188
2010	179

Source: IPUMS National Historical *Geographic Information System; Version 12.0* [Database]. Minneapolis: University of Minnesota 2017.

density of the area to be around 2,100 persons per square mile in 1930 (an approximation because the 1930 census tracts do not align exactly with current Ward 8 boundaries). One could use census tracts from 2011-2015 for a comparison because one could match the area of the 1930 tracts (even though the number of tracts in 1930 was 4 and the number of tracts in 2011-2015 was 26). The population of the Ward 8 area in 2011-2015 was around 9,150 which is an increase of 30% over 1930.

Figure 1: District of Columbia Population Density Maps: 1930-2010
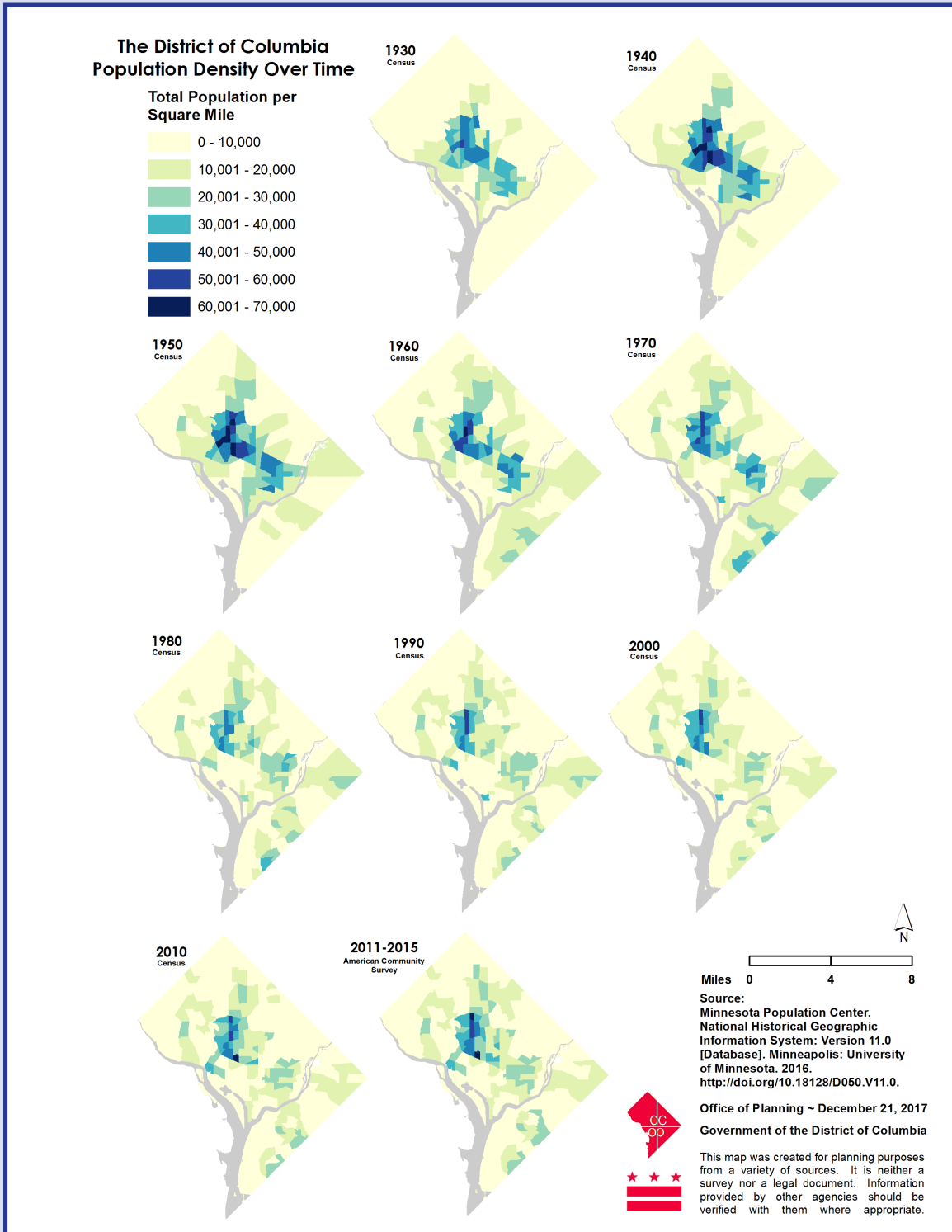
Source: IPUMS and District of Columbia, Open Data DC, www.opendata.gov

Census tract boundaries themselves have gone through minor re-alignments (where the boundaries are drawn "on the ground") over time. The tracts from 1930 to 2000 are consistent with each other in their alignment. However, the 2010 census tract boundaries were adjusted by the Census Bureau more recently to better align with roadways. Therefore, there are alignment discrepancies between 2010 census tracts and earlier time periods. These discrepancies should not lead to any issues for comparing 2010 information with other years.

Historical Trends

The series of population density maps of the District of Columbia from 1930 through 2010 as presented in Figure 1 is a good reflection of the historic events of each decade and the resulting population density impacts. Beginning in 1930, the population of the District of Columbia was 486,869. Given a land area of 61 square miles, this resulted in a population density of 7,981 persons per square mile (see Table 3). The concentration of the District's population in 1930 and 1940 followed the development of the city's electrified streetcar lines along major arteries closer to downtown such as Pennsylvania Avenue, Connecticut Avenue, Wisconsin Avenue, Georgia Avenue, 14th Street and 16th Street. Areas of exception to the District's population concentration as depicted on the 1930 and 1940 maps were the far Northwest, far Northeast and far Southeast corners of the city.

As World War II activities created a demand for federal employees, defense contractors and other supporting personnel, people from other areas of the country came to the District to work in wartime (1939-1945). The population of the District increased to 802,000 with a density of 13,150 per square miles by 1950, as the war ended and most of the wartime population remained in the District. To accommodate the over 315,000 people that came to the District during the war, housing units were built further out from the central core of the city but mainly along the arteries of the streetcar lines, as show in the 1950 and 1960 maps.

Beginning in the 1960s, the District began losing residents attracted to the suburbs, a pattern repeated nationwide. By 2000, the District population dropped to 572,000 with a density of 9,377. The events of the decades from the 1960s and their impact on the population density are reflected in each of the consecutive maps from 1960 through 2000 where the higher density areas have shrunken further from decade to decade.

Beginning in 2000, however, the District began laying the ground work for a population turnaround. With significant investments in economic and social infrastructure the District's population began growing again in 2006. By 2010, the population was recorded at 601,723 with a density of 9,864 per square mile. In addition to traditionally dense areas around downtown, the population is now concentrating in several areas like NoMa, Petworth, Brightwood, Douglass Shipley, and Washington Highlands.

Table 3: District Population and Population Density: 1930-2010		
Census Year	**Population**	**Density**
1930	486,869	7,981
1940	663,091	10,870
1950	802,178	13,150
1960	763,956	12,524
1970	756,510	12,402
1980	638,333	10,464
1990	606,900	9,949
2000	572,059	9,378
2010	601,723	9,864

Source: IPUMS National Historical *Geographic Information System; Version 12.0* [Database]. Minneapolis: University of Minnesota 2017.

A simple research example – Tracts surrounding METRO stops increased in transit usage vs tracts without METRO stops.

The following is an example of simple, exploratory research of what could be a much larger research topic about the impact METRO has had on DC's use of public transportation to get to work. A hypothesis might be: Census tracts around METRO stops will show a higher percentage of commuters using public transportation to get to work. The historical census tract database can be used to test this question. Figure 3 shows a time series maps depicting the pattern of public transit use since these types of data were first collected in 1960. To see how Metro's development has altered how residents use transit (or conversely, stop driving their cars to work), Metro stations have been overlaid on the maps. The stations are present on the map if they were open to the public before the Census or ACS was taken. Using GIS to conduct a spatial analysis, census tracts were selected if they were within ¼ mile of a METRO station. The analysis shows the initial hypothesis was correct (except for 1980). 37.8% of commuters living near METRO stations used public transportation in 1980, which grew to 42.6% in 2011-2015. In 1980, 39.5% of commuters used public transportation to get to work who did not live near a METRO station. That number fell to 36.2% by 2011-2015. Conclusion: A greater percentage of commuters used public transportation to get to work in census tracts near METRO stations.

Public transit use seems to have been used in larger percentages by those in the city center, but was gradually accessed more and more by those in the peripheral areas of the city. The Tract with the highest percentage of residents using public transportation to get to work in 1960 was Tract 43, around 16th St NW and U St NW, which was about 75%. Other tracts with high use of public transportation were in central DC and in the Navy Yard area. By contrast, the most recent ACS shows high use tracts scattered around the District in areas like, Washington Highlands, Anacostia, Greenway, Edgewood, and Columbia Heights.

Data Source

The DC State Data Center would like to thank the IPUMS National Historic Geographic Information System for making the historical census data available.
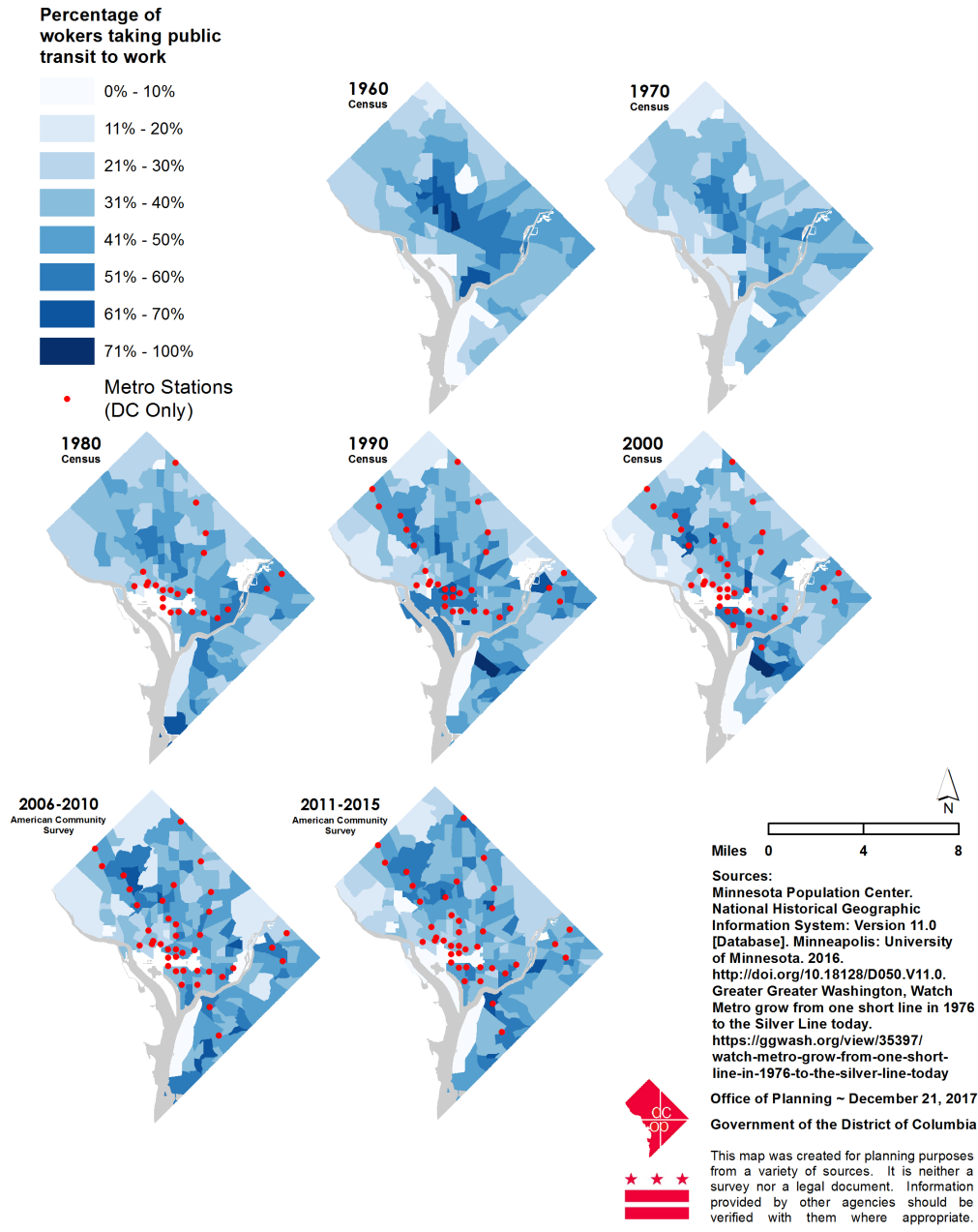
Steven Manson, Jonathan Schroeder, David Van Riper, and Steven Ruggles. IPUMS National Historical *Geographic Information System: Version 12.0* [Database]. Minneapolis: University of Minnesota. 2017. http://doi.org/10.18128/D050.V12.0

Figure 2: Percentage of Workers Taking Public Transportation to Work

The District of Columbia,
Use of public transportation & the development of Metro

A look at how District residents utilize public transit as the Metro system was developed.
The Metro Stations on each map were open at the time the Census and American Community Survey were taken.

Percentage of wokers taking public transit to work

- 0% - 10%
- 11% - 20%
- 21% - 30%
- 31% - 40%
- 41% - 50%
- 51% - 60%
- 61% - 70%
- 71% - 100%

• Metro Stations (DC Only)

1960 Census

1970 Census

1980 Census

1990 Census

2000 Census

2006-2010 American Community Survey

2011-2015 American Community Survey

N

Miles   0   4   8

Sources:
Minnesota Population Center.
National Historical Geographic
Information System: Version 11.0
[Database]. Minneapolis: University
of Minnesota. 2016.
http://doi.org/10.18128/D050.V11.0.
Greater Greater Washington, Watch
Metro grow from one short line in 1976
to the Silver Line today.
https://ggwash.org/view/35397/
watch-metro-grow-from-one-short-
line-in-1976-to-the-silver-line-today

Office of Planning ~ December 21, 2017

Government of the District of Columbia

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verified with them where appropriate.

Source: IPUMS and District of Columbia, Open Data DC, www.opendata.gov

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