**District of Columbia**

**Office of Planning**

 **Single-age Population Forecast Methodology and Assumptions**

**Introduction**

The population forecasts for the District of Columbia and its 46 neighborhood clusters were prepared by the Office of Planning State Data Center, with assistance from the Citywide Planning division. These forecasts involve the use of certain assumptions about future events that may or may not occur. Users of these forecasts should be aware that although they have been prepared with the use of detailed methodologies and with extensive attempts being made to account for existing demographic patterns, they may not accurately reflect the future population of the District, or of particular neighborhood clusters in the District, due to some degree of uncertainty in projecting future events. These forecasts should be used with full awareness of the inherent limitations in general and with specific knowledge of the procedures and assumptions delineated below which characterize the forecasts presented in this report.

These population forecasts comprise the District as a whole, including the 46 neighborhood clusters in the District, for each year from 2015-2030. They are by single year of age for ages 0 through 85 years of age and older, for males and females. This report describes the forecast methodologies for the upper (high) and lower (low) limits and discusses the basis for, and the assumptions used in its development. It concludes with a summary of the products available from the forecast process.

**Forecast Methodology**

The population from 2015-2030 for the District and its 46 neighborhood clusters is forecast using the cohort-component method. The basic logic of this method is that future population is a function of present (baseline) population plus the three components of demographic change: fertility, mortality, and migration.

The baseline populations are grouped into cohorts defined by age and sex, and the projection proceeds by updating the population of each age- and sex-specific group according to assumptions about the three components of population change. Each cohort survives forward to the next age group according to assumed age-specific mortality rates. This calculation is made for each age group and sex, and repeated for each time period as the forecast proceeds. The size of the youngest (zero) age group is affected by the number of births, which is calculated by applying assumed age-specific fertility rates to female cohorts in the reproductive age span (10-55 years). A calculated District-wide sex ratio at birth is used to divide total births into males and females. Migration is accounted for by applying age- and sex-specific net migration rates to each cohort.

The base formula used in the projection model to express this function is:

Pt2 = Pt1 + Bt1-t2 – Dt1-t2 + Mt1-t2

Where: Pt2 = population projected at some future date *t1-t2* years

 Pt1 = population at the base year *t1*

 Bt1-t2  = number of births that occur during the interval *t1-t2*

 Dt1-t2 = number of deaths that occur during the interval *t1-t2*

 Mt1-t2 = amount of net migration that takes place during the interval *t1-t2*

When several cohorts are used, Pt2 may be seen as:

Pt2 = Σ n Pci,t2

Where: Pt2 is as in the equation above

Pci,t2 = population of a given cohort at time *t2* and

Pci,t2 = Pc1,t1 + Bci,t1-t2 – Dci,t1-t2 + Mci,t1-t2

Where: all terms are as noted above but are specific to given cohorts *ci*

**General Assumptions**

* Fertility rates are expected to gradually decline throughout the projection period;
* Mortality rates are expected to decline slightly throughout the projection period;
* Life expectancy is not expected to change significantly;
* Migrants to the city are expected to maintain current health outcomes;
* Development activity indicated by planned and conceptual residential housing units are the best predictor of where the majority of new migrants to the city will reside; and
* The single-age distribution of migrants by neighborhood cluster will be similar to the single-age distribution of the existing population in each cluster.

**Specific Assumptions for the High Level Scenario**

* Pace of growth in the next ten years is similar to the more recent growth period (2010-2015);
* Strong private sector job growth causing migration to DC and the region; even with the uncertainty of the federal budget and procurement process;
* The growing perception of the District as a world capitol that attracts foreign labor;
* The birth rate is expected to stay relatively constant as the population increases reflecting gradually declining fertility rates, combined with declining mortality rates this results in steady net natural increase in population;
* Abundance of choices for transportation, entertainment, leisure, education, health, housing, food will continue to attract and maintain more people;
* Improved public school performance and government initiatives like universal pre-K will continue to attract and retain a greater percentage of families with children; and
* New job opportunities will continue to attract young professionals, while retiring baby boomers will attract middle aged workers to fill vacant senior positions;

**Specific Assumptions for the Low Level Scenario**

* Overall growth will continue but at a slightly reduced rate compared to the 2010-2015 period;
* Private sector job growth will continue but will not fully offset the decline in federal government jobs;
* Births are expected to increase at a declining rate as population grows reflecting declining fertility rates. When combined with declining mortality rates, this results in continued net natural increase in population;
* Abundance of choices for transportation, entertainment, leisure, education, health, housing, and food elsewhere will provide added competition for DC to attract and maintain people; and
* Improved public school performance and government initiatives like universal pre-K will continue to retain some families but a significant proportion will still leave the city with their children.

**Benchmarks**

The Office of Planning State Data Center, the Citywide Planning division, and the Washington Council of Governments (COG) prepared a forecast of population, households, and jobs for five year increments from 2015 to 2045. These forecast numbers are based upon permits for current and future development. The population totals at these five-year increments served as benchmarks (control totals) for this forecast.

**Step 1: Citywide single age forecast**

Using the U.S. Census 2015 Population Estimates as the baseline population and the COG 9.0 forecast numbers as benchmarks for 2020, 2025 and 2030, the cohort method was used to derive citywide single age by sex populations for annual growth from 2016-2030. Migration rates from 2010 to 2014 where applied for births, survivorship, and migration each year. Weights were applied to some single-age groups and years in order to meet the population benchmarks.

**Step 2: Apportioning population to neighborhood cluster**

The U.S. Census 2010-2014 American Community Survey 5-Year Estimates (census tract geography) and the COG population derived from residential development activity (transportation analysis zone geography) were used to allocate the 2015 Population Estimates to the District’s 46 neighborhood clusters.

**Step 3: Deriving the 2020 and 2025 forecasts by neighborhood cluster**

The single age population was derived for 2020 and 2025 by adding the COG population by cluster to the 2015 cluster population from step 2. Age 0 to 17 and Age 65 and over apportionment for each age group was adjusted for each new time period but kept relatively consistent with the same proportions as the 2010-2014 American Community Survey 5-Year Estimates. Age 18 to 64 was apportioned according to 2010-2014 American Community Survey 5-Year Estimates as well as allowing for some change due to new residential development activity.

**Products:**

* District-wide total population 2015-2030 by single-age and gender
* District-wide population 2015-2030 by age group 0-17, 3-17, 25-34, 65+
* Annual and five-year numeric and percentage population change
* DC resident births and fertility rates from 2015-2030
* DC residents deaths and death rates from 2015-2030
* Natural increase from 2015-2030
* Net migration and net migration rates from 2015-2030
* Neighborhood Cluster total population 2015-2025 by single-age
* Graphs of population by age, fertility, mortality, migration, and natural increase
* Maps of population change by age by neighborhood cluster

**Note: Analyses of the forecast results are presented in a separate PowerPoint.**