



## Virginia Population Projections Methodology

This document describes in detail the steps involved in developing projections for the Commonwealth of Virginia and its 133 localities—95 counties and 38 independent cities—for 2020, 2030, and 2040. We use a combination of exponential growth and linear extrapolation to derive the projections. The state population total is from the national projections, also developed by the Weldon Cooper Center’s Demographics Research Group.

### Data:

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The following state and locality data are used as input,

- 2000 census total
- 2010 census total
- 2015 estimate by Weldon Cooper Center total

### Total Population Projections

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The total population for each locality is calculated individually, and then raked according to the state control total.

#### Approach for 2020 total population:

- Calculating exponential population growth rate for each of the 133 localities, using data from 2010 and 2015.

$$LocalityPopulation_{2015} = LocalityPopulation_{2010} * e^{r*5.25}$$

which implies the rate is

$$r = \frac{1}{5.25} * \ln\left(\frac{LocalityPopulation_{2015}}{LocalityPopulation_{2010}}\right)$$

- Calculating the projected locality population for 2020 from exponential growth, using 2015 as the launch year,

$$LocalityPopulationExp_{2020} = LocalityPopulation_{2015} * e^{r*4.75}$$

- Setting the final locality level population projection for 2020, by redistributing the state control total,

$$LocalityPopulation_{2020} = \frac{LocalityPopulationExp_{2020}}{\sum_{Locality} LocalityPopulationExp_{2020}} * StatePopulation_{2020}$$

### Approach for 2030 and 2040 total population:

- Calculating the annualized growth between 2000 and 2015, and applying it to the decade,

$$LocalityExpectedGrowth = (LocalityPopulation_{2015} - LocalityPopulation_{2000}) * \frac{10}{15}$$

- Calculating the projected locality population for 2030 from linear extrapolation,

$$LocalityPopulationLin_{2030} = LocalityPopulation_{2020} + LocalityExpectedGrowth$$

- Setting the final locality level population projection for 2030, by redistributing the state total,

$$LocalityPopulation_{2030} = \frac{LocalityPopulationLin_{2030}}{\sum_{Locality} LocalityPopulationLin_{2030}} * StatePopulation_{2030}$$

- Calculating the projected locality population for 2040 from linear extrapolation,

$$LocalityPopulationLin_{2040} = LocalityPopulation_{2030} + LocalityExpectedGrowth$$

- Setting the final locality level population projection for 2040, by redistributing the state total,

$$LocalityPopulation_{2040} = \frac{LocalityPopulationLin_{2040}}{\sum_{Locality} LocalityPopulationLin_{2040}} * StatePopulation_{2040}$$

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### REFERENCES:

Stanley K. Smith, Jeff Tayman, and David A. Swanson. 2001. *State and Local Population Projections: Methodology and Analysis*. New York: Kluwer Academic/Plenum Publishers.